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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

THE CULTURE OF THE POTATO.

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From the Quarterly Journal of Agriculture.

"The subject of the potato culture is yet quite open to the experimenter. Experiment on it by all possible varieties of ways is our advice; and when a sufficiency of facts have been collected, we shall then, but not till then, be warranted in theorizing on the nature of the potato plant." It is neither loss of time, nor useless repetition, to copy verbatim the closing paragraph of the editorial note, p. 110 of the last number, 41; for, by so doing, attention may be rivetted to a very grave subject, and also to the other papers, in the same number, to which the note refers.

Considering the admonition to experimentize in all possible varieties of ways as most sound advice, I believe that I shall be acting in accordance with it, by entering into a detail of the various methods of culture which I have pursued during a period of eight or more years, and noting down, as far as existing documents permit, the corresponding results. I will premise that, previous to 1830, my practice was regulated by that of ordinary cultivators in the west of Wiltshire, where I then resided; but that subsequently, in consequence of the frequent intercourse by letters with the venerable (late) President of the London Horticultural Society, and of receiving numerous varieties of potato from that gentleman, the product of his own unremitting experiments, I altered my practice, and have met with great success. At the period when the public press was burdened with alarming notices of "failure," I never saw an unhealthy plant, with one most singular exception, which I will, in its place, adduce as such. If this article fail to announce, or give weight to any new and important facts, it will, at the least, offer a pledge of what has been, and may again be successfully attempted. The opinions and theory of the lamented president shall be referred to, and thus the reader will be placed in possession of some valuable extracts from original letters, which are by me esteemed very precious relics, for they are now all that remain of one of the most candid, liberal, unselfish minds that ever adorned the world of science.

In the cultivation of the potato, the chief object ought to be the production of the utmost quantity of that mealy substance which constitutes the nutritive property of the root. This substance was formerly called the *farina*, a term which, if referred to qualities resembling those of meal or *flour*, can by no means be admitted, because of the total absence of that peculiar *gluten* which distinguishes the flour of grain, and qualifies it to undergo the panary fermentation, and become bread. *Amylum* and starch, on the contrary, are correct terms; and with this remarkable substance the potato abounds, but to a greater or less extent, according to the ground in which it grows, and to the routine of culture to which it is subjected.

By the analysis of Einhoff, referred to by Sir H. Davy, in his agricultural lectures, the following results were obtained:—

From 7680 parts of potato—	
Of starch *(amylum)* - - -	1153
Fibrous matter, analogous to starch	540
Albumen - - - - -	107
Mucilage, in a state of saturated solution - - - - -	312
	2112
Residue, or loss, must have been worthless fluid= - - - - -	5568

Thus the starch, to the extent of about 1700 parts in 7680, constitutes the chief material of food, because the mucilage in solution, represents only just so much gum-water, and the *vegetable* albumen can hardly be admitted to be equal to a like quantity of the "white of egg," *animal albumen*.

My own more simple and familiar analysis, described in the 'Domestic Gardener's Manual,' under the article "*The Potato*," gives, from eight pounds of washed, but unpeeled potatoes, finely rasped,—

	lb.	oz.
Of amylum or starch - - -	1	6
Of pulp, after pressure by hand -	1	11
Loss in water, or soluble matters -	4	15

The amylum, whether it exist in the state of powder, or in the form of "*fibrous matter* is the substance which confers excellence upon the vegetable. Potatoes will grow in any soil, from that of the loosest sand, if it be united with some reduced vegetable matters, to the strongest clays of agriculture; but what is of still greater moment to the subject under consideration—the produce in amount or quality appears to be materially influenced by local agencies, even in soils of the same constitution. Thus the sands which bring fine mealy tubers in Somersetshire, fail in other quarters of the kingdom. On this ground only can we account for the discrepancy which we meet with in the papers of the many cultivators who have given publicity to their practice and opinions; one asserting that the light and dry lands bear the best crops, while another maintains, that stiff and clayey soils are most congenial. The operations of soils, therefore, are contingent; and it is proved, almost to a demonstation, that potatoes which are excellent in West Wiltshire, as for example, the varieties there termed the "early purple-eyed," and the "Princes beauty," became deteriorated in Berkshire, treat them how you may. Lancashire is famed for its varieties which boil to a meal that crumbles under the fork, and is nearly as white as flour, but the varieties change in the midland and southern counties. That soil, and routine of culture, which produces the strongest haulm, and most expansive system of foliage, will yield the greatest bulk of tubers; hence the opinion which we constantly hear expressed, "*that the potatoes run away into haulm*," is a fallacy, because experience proves, what physiology teaches, that the tuber is the product of the foliage, by the quality and breadth of which its comparative substance is

regulated. But experience and facts also demonstrate, that when the foliage is rendered too massive, and the stems become too high, and therefore unable to support the weight of a luxuriantly rank herbage, the tubers, though large in size, numerous, and weighty, are poor in quality, deficient of amylum, and frequently hollow. *A medium growth*, wherein the balance of strength is supported between the stem and leaves, is the result of a well prepared and healthy soil, reciprocating with the stimulus of the sun's rays, and the decomposing agencies of atmospheric air, and of water. Such a soil will yield sound tubers, be it sandy, light, and easily pulverizable, or unctuous and adhesive. And on these grounds, quality, *firmness* of texture, and *mealiness*, ought to be the standard, rather than weight of tuber. Thus, in the west, we find the return from the seed sown in the sands, however sound and excellent it may be, is still little more than half what may be, and is produced in the rich loams of Berkshire. In the latter, I have been told of 700 bushels, of 60 lb. each, from the statute acre; whereas I have seen little more than from half to three-fourths of a bushel, digged up from the rod or perch, in the grey sands of Wilts, which is in the proportion of little more than 100 bushels per acre. Mr. Knight has calculated that 1000 bushels, imperial measure, each weighing 80 lb., may be produced; and experiment goes far to shew what *can* be effected. Nevertheless, take one country with another, the utmost average might perhaps be rated at 300 bushels of ordinary weight, four bushels to the sack. To conclude this view of the old treatment, and its results, it will be only needful to state, that potatoes of the smallest medium size, were cut into sets, each containing from one to three eyes—the rose, or crown ends, being frequently rejected; the sets were then suffered to become dry under a shed; the starch setting and coating the wounded surfaces, and the texture becoming soft and flaccid, in consequence of the emptying of the cellular tissue by evaporation. Could robust growth, or large healthy produce, be reasonably expected to result from treatment so diametrically opposite to sound philosophy? *Disease*, however, is not now contemplated—*that*, perhaps, was purely local and epidemic; but it were as rational to expect vigor and strength by the operation of agents purely debilitating, as to hope for great bulk and prolificity, from mangled fragments of tubers, rendered inert by exhaustion.

My correspondence with Mr. Knight, upon the subject of potato-culure, commenced in 1831. A letter dated 4th February of that year, is now before me, and from it I extract the following connected particulars entire. These, I imagine, will now prove a source of valuble information to others, as they did to me, at the time when I derived the first correct knowledge of that improved culture, which must finally, if it be duly appreciated, supersede the old and faulty routine.

"I obtained," said Mr. Knight, "from the *ash-leaved kidney*, last season (a bad one), a produce equal to 670 bushels, of 80 lb. each, per statute acre; and I entertain no doubt of having as many this year. To obtain these vast crops of the ash-leaved kidney, I always plant them *whole*, selecting *the largest* I can raise, and from *very early crops:* those ripened early in the preceding summer are kept dry. I usually plant them upon their *ends*, to stand with the *crown end* upwards, and place them at four inches distance from centre to centre in the rows, and the rows two feet apart, and always pointing from north to south. I plant my large potatoes much in the same way, but with wide intervals, according to the height which the stems acquire.

"Thus I plant 'Lankman's' potato" (a noted variety, then, I believe, the subject of experiment), "which grows a yard high, at six inches distance from centre to centre, and three feet six inches, or four feet between the rows; *never cutting any potato*, nor planting one of less weight than a *quarter*, but generally *half a pound*. By using such large sets, I get very strong, and large plants, with widely extended roots, early in the summer; and I begin working, as it were, with a *four-horse*, instead of a one-horse power. I do not despair of getting 800 bushels of pototoes from an acre of ground, if I live long enough to see the produce of some new varieties, which I have formed, and which are of very vigorous growth, whilst they do not expend any thing in blossoms. The *blossoms take away a good deal of sap*, which may be better employed in forming potatoes; and whenever a potato affords seeds freely I think it almost an insuperable objection to it. As a general rule, I think potatoes ought to be planted in rows distant from each other in proportion to the height of the stems; the height of the stems being full three feet, the rows ought to be four feet apart, and the sets (tubers) of the *very largest varieties* planted *whole*, never to be more distant from centre to centre than six inches. By such mode of planting, the greatest quantity of leaf (the organ in *which alone* the vital nutritive fluid is made) is exposed to the light. I have this year obtained many seeds of the ash-leaved kidney potato, crossed with another early variety, from which I expect some valuable early varieties, though I scarcely hope to get any thing preferable to the ash-leaved, *if that would not wear out.*"

The foregoing passage may, I conceive, be regarded as a compendium of philosophical culture. The extract which follows, is from a letter dated 5th July in the same year; it contains interesting observations on the means to accelerate or retard a crop of potatoes. Speaking of the earliest variety, Mr. Knight observed—"The tubers which have ripened early in one season, are alone proper to plant for a very early crop; those which have ripened *late*, being not sufficiently *excitable*, though more eligible for a late, or rather a moderately early crop, the produce of which will be proper to plant for a very early crop. By attending to these circumstances, and by planting tubers large enough, and near enough in the row, with proper intervals between, according to the height to be attained by the stems, you will be able to obtain much larger crops per acre, than are usually obtained."

As respects the age or condition of seed-tubers, Mr. Knight says—"Potatoes somewht immature, are quite as good for planting in the following year, as others; and in some cases, perhaps in many, better: for, a particular disease, formerly well known under the name of '*curl*,' appeared on plants raised from mature tubers, and not from those raised from immature tubers."

During the years 1830-1-2, Mr. Knight had raised, by cross impregnation, a great many vari-

eties, fourteen or fifteen of which he sent to me, as specimens: they all possessed the characteristic mark of excellence, which it was the object of the originator to attain—that of *developing no perfect flowers*; the flower-stalk would rise with its germs of blossom, but these would suddenly become yellow, and fall off, without expanding, consequently the plant had all its energies devoted to the subterraneau expansions. Of the enormous yield of several of these varieties, I hold by me the written proofs. One which was numbered 4, Mr. Knight states to have produced 23 cwt. 1 qr. 76lb. per acre!

With these, and other facts before me, it was natural that a course of experiments should be immediately instituted; and these have been persisted in, with some modifications to the present day. My practice, therefore, differs from that of every ordinary cultivator, and its results, which will now be stated, cannot be reckoned unsatisfactory. I have not, however, adhered rigidly to the system of Mr. Knight, in planting entire tubers, because it sometimes required more seed-stock than could at all times be conveniently spared. But there are cases which require certain modes of practice, and these ought to be clearly understood by those who cultivate several varieties. A few lines will render this sufficiently clear.

Every county has its own peculiar favorites; and local names are applied, which make it difficult to identify varieties. All persons, in England at least, appear to understand and appreciate the qualities of the early *ash-leaved kidney potato*, and therefore I assume it as a standard for the treatment of varieties intended for the earliest summer supply of the table, rejecting as irrelevant to the present inquiry, any reference to artificial excitement, either by frames and glasses, or by warm beds of fermenting materials.

The growth of every plant must imply the production of heat, and of this heat there are ample sources to be found in the decomposition of water, and vegetable or animal matter in the ground, by the agency of that enormous volume of the electric elementary fluid, which holds the constituents of those substances in a state of natural union. In planting the ash-leaved kidney, it is my practice to provide for early developement, and ample security from spring frost, by digging trenches six or eight inches deep, and nearly a foot wide, throwing the earth in the form of a ridge on either side of the trenches. Into the soil, at the bottom of each trench, three or four inches of half decomposed stable manure, with leaves, used for linings, are digged, and then a little light earth, if required, is raked in, sufficient to leave the surface, when settled, about four inches below the level of the ground. The ash-leaved potato has very few eyes, therefore it is desirable never to cut it into sets; the potato is pressed into the soil, upright, the eyes being uppermost, and the potatoes standing five inches asunder, according to the directions by Mr. Knight. Earth from the ridges is drawn over the crowns, to the depth of an inch, and occasionally half an inch of sifted ashes, or of light linings' manure is superposed, thus making the first covering an inch and a half deep.

It is the usual method to place the potatoes, or sets, four or five inches below the surface of level beds, and when the shoots appear, to draw earth to the stems. But by the trench-planting, which may be performed in March, or even earlier, the crowns and advancing buds are quite sufficiently protected from the frost, unless it happen to be of very severe character, and then an inch or two of light litter may be laid in the trenches. The great mischef, however, which befals the earliest plots, is occasioned by frosts in May. Now, the trenches afford protection to the tubers, while under ground, and as soon as the shoots are seen above the surface, fine earth is raked or hoed from the ridges, so as to cover the first developements. As the shoots advance again, more earth is drawn down, till at length, the trenches being filled, the level of the surface is again produced, and with it a sufficient and ample depth of earth is afforded to the tubers, and their fibrous processes. All then that remains to be done, is to dig the ground between the rows, to the depth of three inches, sufficiently to give freedom, and openness of texture. I am averse from ridging and earthing-up, as I can see no utility in it, and never once found an additional potato from its adoption. I have seen whole ranks of potatoes blackened by the frost of an hour or two; and even in the present season, have been told that great destruction was produced by the frost of the 16th of May. My thermometers gave proofs of at least six degrees, but the potatoes remained safe; and if any persons be inclined to cavil against the practice recommended, I can only, in self-defence observe, that frost has never hurt me;—my potatoes have lost no shoots, have run their course uninterruptedly, and have evinced neither failure nor disease.

In 1836. March 16 to 19.—Four rows were planted, in trenches between single asparagus rows, and about eight feet asunder; they yielded 72½ lb., from 12¾ lb. of seed-tubers.

In 1837. March 3 to 7.—Twelve pounds were set in a single trench, twenty-four yards long—abreast, and four feet in advance of a wall, with an aspect south by east. From this row were digged 72lb., of excellent flavor. In planting this variety, I have never been very particular as to the direction of the rows, but have placed them widely asunder. The yield has rarely exceeded six times the weight of the seed. There are so few eyes in this potato, that extensive herbage cannot be expected. Indeed, on some occasions, blanks were observed; yet a progeny of potatoes was found to have been produced, without the protrusion of any superficial herbage. It is, however, of great moment to protect the foliage from frost, as soon as it becomes visible, because a shoot lost cannot so readily be re-supplied, as it is by other varieties, prolific in eyes. I am aware that I have trespassed considerably upon the time of the reader, on a subject not strictly connected with the farm; yet it appeared essential not to overlook the garden varieties, in an article which is designed to furnish a standard of comparison. I pass, however, to the store varieties, without further remark.

Winter potatoes.—Such are all that are not digged for use till after Michaelmas, and of these every county, nay almost every parish, has its own peculiar favorite. Some, however, are in prime condition before, and two months subsequent to Christmas, while others ought not to be cooked till April. I lately cultivated a round potato, which bore the title of Cornish rough-red. It was hard as a cricket-ball, and almost as round, and never started an eye till June, while it remained out

the soil. The pushing of the eyes affords a pretty correct guide as respects the time when a potato is in season, and when it ought to be planted. If during the winter, the tubers be kept in a dry cave or pit, where the utmost degree of equable cold can be maintained, consistent with the exclusion of actual frost, the quality and flavor will remain more pure than when they are covered by any moist or fermentable material whatsoever. If, under this simple, unexciting treatment, any variety protrude its eyes, that variety is not *a keeper*. This is the only complaint which can be advanced against that truly excellent, and widely cultivated potato—

The Early Shaw.—Its skin (*testa*) is of pale buff, covered with a rough, russety membrane, and herein it differs from the *Champion*. Both of these capital varieties possess the defect or vice of blossoming and fruiting copiously; yet they are too finely-flavoured to be rejected. In all countries there are *kidneys*—red, white, or mottled, which possess qualities adapted to soil and atmosphere; but with the exception of Mr. Knight's crossed seedlings (of which the *Downton Yam* is a fine specimen), I know of none that cast the blossom-buds ere the flowers expand.

All these medium and long keepers are furnished with a number of eyes, distributed over the greater part of the surface, yet abounding most at that end which is opposite to the point where the organic process, or funis entered, which supplied the tuber with nutriment derived from the parent stem. The end where the eyes are chiefly congregated, is termed the rose, or crown, while that which was connected with the parent, is termed the root-end. Many persons reject the former, believing that it produces too much haulm. But the fact is, that as in the shoot of a tree, if one or two good buds break, they push on, leaving the inferior buds silent and unexcited. Thus, rejecting the root end, it is advantageous to cut a large potato that abounds with eyes, into sets, to comprise not fewer than *two*, nor more than *three* eyes; and in cutting, to distribute the crown eyes fairly, as may be, among other eyes situated below them, by making the cuts in a diagonal direction. I know, by experience, that Mr. Knight acted upon sound and secure principles, when he recommended the planting of entire tubers, because he knew well that an ample yield might be assured, one or more of the eyes of each being certain to break. Moreover, in the event of that shoot or shoots being cut off by frost, other eyes, till then inactive, would be ready to produce successional shoots.

Two facts of importance in physiology, now present themselves to our notice: *First*, All the eyes of entire potatoes do not push at one time, therefore it is a mistake to suppose, that a plot becomes crowded by useless haulm, if the potatoes be planted whole. *Again*, persons have imagined, that weakness of the root is occasioned by the destructive action of frost upon the earliest shoots; this also is a mistaken notion, for, if any eyes remain unexcited in the tuber under ground, the loss of one shoot is speedily supplied by the substitution of another. Time indeed may, to a certain extent, be sacrificed, but that is all. Of this any one may convince *himself*, by endeavoring to exterminate a straggling potato; he may hoe, or pull off the first shoots, and think his ground cleared of the intruder; but in a week or two, the spot will be again occupied, and it will be perceived, that nothing short of the complete removal of the tuber can prove effectual. If *sets*, with one or two eyes, have been planted, and have sent up all their shoots, then the destruction by frost may prove fatal; but it may happen, that a shoot shall appear to be killed to the ground, and yet produce a fruitful plant, though late in the season, from embryo eyes seated around the stem, near its point of emersion from the potato.

Since it appears a demonstrable fact, that *whole potatoes* rarely *develope* all their eyes, it becomes a question of economy, whether it be not better to plant *cut sets* of the keeping varieties. Many persons cannot spare a large stock for seed; and in that case, it will be prudent to employ sets, with two or three eyes, taking especial precaution to guard the plants from late frosts, and promoting the utmost activity of vegetation, by a wise system of culture; the general principles of which are found in the extracts before given, from the letters of Mr. Knight.

These principles refer chiefly to the influence of *light upon* the foliage, and it certainly is a fact, that by making the rows in the direction of north and south, the sun at mid-day shines along the entire line, exerting his greatest power of attraction, in a way which tends to retain the upright position of the haulm. But there are other considerations which refer to *soil* and *nutriment*, and these must be always kept in sight.

The texture of the soil should be naturally free, if possible; but as the desirable medium is not always at command, it will be prudent to set up heavy land in ridges, during the autumn, to expose a great surface to the frost. The manure required should be introduced at the same time, with a quantity of seacoal ashes, if obtainable. Sand, even in excess, will frequently fail to meliorate heavy, binding earth; but ashes, which contain a large proportion of finely divided silex, some red oxide of iron, and a little alkali, produce the happiest effects. In alluding to this autumnal preparation, I have a double object in view, dependent upon the habits of the potato. The plant affects a light and moderately enriched soil, wherein its fibrous roots, and tuber-bearing processes may wander laterally, but not deeply; therefore, whether the plough or spade be used, the manure ought to be blended with the earth prior to its being thrown into ridges. that the whole mass may be mellowed by the winter's exposure. Six inches of well laborated earth, over a more solid subsoil, is amply sufficient for the play of the roots, consequently, the ridges ought to be raised to the height of twelve inches. After the winter, the soil cannot be too much broken down, nor the manure too intimately incorporated with it; but for these purposes a dry season should be chosen, otherwise the labor of the previous operations will be thrown away, and the main object defeated. I believe that the quality of potatoes is much injured by strong recent manure. Autumnal preparation effects every purpose; the manure is elaborated, but not dispersed; it loses rankness, but is brought to the condition of what is fancifully called *humus*, a hydro-carbonous substance, brought to a condition which fits it to supply vegetable aliment when exposed to the decomposing stimulus of the vital principle. *Sands*, however, ought not

to be raised into ridges; they decompose manures rapidly, and whatever organic substances are applied to them in autumn, should be placed some inches below the surface. It has been shrewdly conjectured, that the straw to be converted to manure ought, as far as is possible, to be brought from land of an opposite quality: thus, if it be intended to meliorate a poor and sandy earth, the farmer should endeavor to obtain his straw from situations where the staple is a strong or clayey loam. Facts are wanting to establish the implied theory, but it merits investigation.

It was customary, as before observed, to keep the sets till much of the moisture had evaporated, and the substance became flaccid; this drying is perfectly needless, and may prove detrimental. It has been a regular practice with me to plant as wanted, fresh from the knife, row by row; and in order to absorb the moisture which exudes from the divided cellular substance, and at the same time to prevent the attacks of grubs and subterraneous vermin, the set has frequently been dipped into powdered lime, fine ashes, plaster of Paris (gypsum), as conveniently at hand. The lime has been recommended, and certainly no mischief of any kind has resulted from the practice. My potatoes, in garden, or field, have always done well, excepting, as I stated, in one solitary instance, of which the following is a faithful narrative.

A few potatoes, with a dark mulberry-coloured skin, but extremely white pulp, were planted, as a trial. From two or three, a number was raised sufficiently to plant one row, in the spring of 1835. On the same bed, and not four feet distant, another variety was set, at the same time, and in the same way. The plants of both rose without failure; but when the purples had attained the height of six inches, the foliage lost the healthy hue; it first changed to a purplish-green, then faded off to a sickly yellow. The ground was hoed, lightened by the spade, and every common means was resorted to, but vegetation could not be stimulated—the plants died; and at the season of digging, not a vestige of a potato remained,—the destruction was total. As every other variety remained healthy, and yielded fairly, and as the soil appeared in good condition throughout the season, no one existing or traceable circumstance tended in any degree to elucidate the mystery.

I have never seen nor heard of that variety since; and it is just possible, on the theory of Mr. Knight, that its term of life was come, and *extinction* the consequence.

Entire potatoes were used by me during two or three seasons subsequent to the receipt of Mr. Knight's specimens, and I selected tubers, of the average weight of *four* ounces, always placing them upright, and regulating the rows, and the distance between the tubers, by the ordinary height of the haulm. As the stems advanced, earth was drawn against them, till at length it formed complete ridges, a foot high on the two sides. Good crops invariably resulted from powerful and healthy growth; but the yield never corresponded with the great bulk of seed-tubers planted, for it averaged about a six-fold proportionate increase. Thus, if 8 lb. were set in a row five yards long, the crop produced would weigh about 48 lb. In 1835 I adopted the practice of planting sets, with the exception of those varieties, early or medium, which are naturally furnished with but few eyes, situated about the crown. I found the yield to be quite equal to that obtained from entire tubers, so that the weight saved was strictly an economy of seed-stock. I believe this remark may be applied even to ash-leaved kidneys, wherein the lower, or root-ends, have very seldom any good eyes; and that of the rose ends, with an inch of the pulp of the potato below, were cut as sets, two-thirds of the substance of tubers might be saved for the table; but the experiment remains to be tried. From the annexed statement of the plantings and proceeds of 1837, some opinions, however, may be formed on the subject; and if ash-leaved potatoes can thus be economized, a considerable saving of expense will be effected, as the dealers sometimes demand ten or twelve shillings per bushel (often not weighing above 52 lb.) for seed potatoes.

Experiments of 1837.

1. A long, *medium early potato*, a variety of kidney, which assumes curious twists, and curvings. The tubers become very large occasionally, but appear to be always of superior quality. This potato is good at any season, from the time of digging, in September, to June following. There were planted, in trenches, 26 lb. of whole potatoes.

12 lb. in the garden, between March 30, and April 5.

14 lb. in an orchard plot, April 6 to 8.

The total yield from these 26 lb. was 354 lb.

2. In the orchard, at different dates, between April 8. and 24.—

Early Shaws, chiefly cut sets of 4 oz. tubers, two and three eyes, limed; a few 2 oz. whole tubers, were used separately—total 30 lb.

The crop was digged, November 6.—weighed 520 lb.

3. *Downton Yams.*—(Knight's). The seed from three or four years succession, in my own garden, or field. Cut into two and three eyed sets, 22 lb. 12 oz.

The crop digged at the same period as the shaws —215 lb.

4. *Early Champions.*—Their first crop, being an exchange with a person whose soil is extremely different from mine. Sets cut by division of the tubers from the crown to root end, picking out the central eye, and after liming, laying the cut sides downward, so that the broad surface of eyes lay uppermost.

Sown April 20. 13 lb.—Yield in November, 150 lb.

5. *A reddish-brown* white *mealed-kidney*, which I have reason to believe was originally brought from Wales, by the late Pascoe Greenfell, Esq., new to me at this planting; received from a distance. The eyes are numerous, and pretty equally distributed; therefore the potatoes were divided *transversely*, so that there were crown-end and root-end sets in different rows. The actual comparative result was not, however, ascertained, because the man employed, did not notice the markers, at the time of digging, and mixed the whole crop. By this oversight, I am prepared only to state, that from 24 lb. of these kidneys, I obtained a return of 356 lb.

It is now left to the experience of the reader to

determine whether these crops surpass those of common culture; and it remains to observe, that all the early varieties were trench planted, and among those, I includethe first variety of kidney, at the head of the list. The keepers (2-5) were planted row by row, during the process of digging and the rows generally four feet asunder. Thus the ground, which had previously been under *broccoli*, was digged to the extent of five feet; then a line being stretched, a drill-trench was chopped down with the spade, drawing the loosened soil forward six inches deep. The sets were herein deposited, five or six inches apart, and were covered with earth made very fine and light; then another space was digged, and a second trench struck out and planted. I have, in the present season, made a further improvement, by sprinkling an inch-deep layer of light hot-bed manure, over the surface of the ground which covers the tubers; thus each row is clearly marked, the soil protected, and enriched, to the width of a foot, without bringing manure into contact with the potatoes. After a time, when the haulm has become six inches high, the intervening spaces are fork-digged, or the soil otherwise, by hoe or spade, rendered light; the little manure which remains is thus intermixed with the surface, and about two inches of earth is drawn over it, and against the stems on each side; this is all the earthing I allow. The soil remains loose and free at top, over a more solid stratum beneath. This is the actual condition the plots are in at the moment of writing (July 29).

It has been conjectured by many, who have accordingly adopted the practice, that potatoes may be planted year after year in the same land. I have never risked the trial to an extent sufficient to decide the question, and, indeed, the difference of soil would at once throw an obstacle in the way, which could not be surmounted; but as far as I have seen, a loam constituted as mine is, does not appear to bring two successive crops of the same potato to a corresponding degree of perfection. It is not to be doubted, that all plants convey into the soil matters either gaseous, fluid, or solid—for the odor diffused will prove the fact to a demonstration; therefore, without dwelling upon the theory of radical, fecal exudation, or claiming the admission that, by analogy, whatever a plant *throws off from its system cannot become salubrious food for another of its own species*, it certainly appears reasonable to vary the crops according to the order of rotation, either in the field or garden. I have acted by this principle, and, whenever it has been in my power, have planted one or other of the cabbage family after potatoes.

But in reasoning by the rules of rotation, we must not be led away from particular facts. The tubers of the potato-plant do not appear to derive support from the soil, they being appended to processes which are conduits of supply downward or laterally from the leaves and stem; the sap-fibres which convey the fluids upward are wholly independent of these processes. Just in proportion to the amplitude of foliage, duly exposed to the sun and air, is the bulk of the crop; hence, although manure, *or humus*, becomes decomposed by the action of the proper roots, and is by them conveyed in the form of raw sap to the herbage, the ground does not become impoverished by the potatoes themselves, however numerous they may be, they being organic bodies (*propagines*), or system of life—a congeries of new plants imbedded in a pulpy and amylaceous mass, which has no connection whatever with the soil. Hence, also, as the potato is thus viewed as a product of the leaves, it becomes the recipient of the exudation, which it thus prevents from contaminating the ground to any considerable extent; and thus, upon the theory of fecal exudation, the potato may be planted year after year on the same spot of ground, with comparative *safety*, but by no means advantageously.

Little remains to be said. The crops I have produced, and their excellent quality, prove, that the rows may stand widely apart, and thus furnish ample space for the horizontal expansion of the radical processes, without causing any diminution of the yield; for what is lost in space one way, is made up by the proximity of the sets in the rows.

The loam (as a staple, naturally) is composed chiefly of a *gritty gravel*, containing a little chalk, more iron, and a moderate portion of alumina—the matter of pure clay; its vice, is the condition of the sand, or siliceous constituent, which renders it binding, under the influence of a hot sun, after rain. A *perfect loam* requires the silex to be in a state of minute division. If this fine silex abound, even to the extent of five-sixths of the whole bulk, leaving the remaining sixth to be composed of alumina, sub-oxide of iron, of a light ochre tint, and chalk (*carbonate of lime*,) the loam will be rich, unctuous, and of high quality; but if a considerable portion of the silex is coarse (the detritus of gravel), the texture of the loam becomes vitiated, and it sets like a brick. Those loams, wherein the iron exists in the form of a per-oxide, assume a purple, or red tint; they are abundant in Somersetshire, and are the staple of permanent fertility.

Agriculture, or the science of cropping and rotation, will never be duly understood, till the constitution of all loams, and their power of decomposing manure *under the stimulus* of the *vital, vegetable* principle be accurately determined by experiment.*

ESSAY ON VEGETABLE PHYSIOLOGY.

[Continued from page 271.]

CHAP. XII.

NATURE OF THEORIES. THEORETICAL ORIGIN OF THE FLOWER. METHOD OF RENDERING BARREN TREES FRUITFUL.

For the Farmers' Register.

In treating of natural phenomena, we very frequently suppose a cause from which they may have arisen, and, for the time, considering this as the true cause, proceed to point out the manner in which they must have been produced. Where the phenomena result so naturally from the supposed cause, as to render it highly probable that it is in-

* When Mr. Towers was explaining the character of the *Ægrostis segetum*, in p. 89, of this volume, we expressed a doubt of the insect described being an Ægrostis. It is but justice to Mr. Towers to take this opportunity of stating, that from the facts which he has since furnished, regarding the character of the insect he described, we are quite satisfied that it is the *Ægrostis segetum*, and no other.—EDITOR.

deed the true cause, we call the supposition a *theory*; where they do not thus naturally result, but still, without doing any great violence to reason, may be considered as resulting from the supposed cause, we term the supposition a *hypothesis*. Theory and hypothesis do not differ from each other in their essential character, but only in their degree of probability. A hypothesis may be looked upon as a probable theory; or a theory, as a very probable hypothesis. When we account for any phenomenon, by tracing it to the cause supposed in theory, and assigning the manner in which it must have been produced, in case the supposed cause be the true one, we are said to treat the subject theoretically. Such is the meaning of these terms, when strictly used in treatises on natural science. We sometimes, though more rarely, use them in a looser way; meaning by theoretical reasoning, the assigning of a cause, and tracing out its operation, in general, when the cause is known to be the true one, as well as when it is only a supposed one. It is so much easier to remember any number of facts when we have in this way connected them together, than it is without such connexion, that these suppositions are found to be of essential service to the student, both in acquiring the facts in the first place, and in retaining them afterwards. And beside this, we may almost always, by reasoning upon our supposition, ascertain facts, which were not known before. If our supposed cause so nearly resembles the true one, that known effects seem naturally to arise from it we might conclude *a priori* that other effects which would arise from the true cause, will seem naturally to arise from our supposed one; and that thus, even though our supposed cause be not the true one, we might, by reasoning upon it, learn facts of which we should otherwise remain in ignorance. And such is found to be the fact. There is no truth more clearly taught, by the history of natural science, than that theory and hypothesis are two of the most efficient instruments which man can make use of, in extending his knowledge of nature. Much objection is often felt and expressed against theoretical discussions, from a misapprehension of their true character. The scientific writer in advancing a theory, and tracing out its application to the subject in hand, does not intend, that it shall be received as a constituent part of our knowledge of nature, or that it shall be placed upon a footing with the facts of science; but only as something which may be supposed, for the purpose of facilitating our acquisition of knowledge, and to be used for increasing the amount of that knowledge. Whether the theory shall, in the end, turn out to be true or not true, so long as it agrees well with known facts, it may be used with great effect in extending our knowledge of nature. We should always, however, remember, that it is nothing more than a supposition; and of course, hold ourselves in readiness to give it up, the moment a more probable supposition is advanced.

I have thought it advisable to say thus much on this subject, as I purpose, in the present chapter to give the commonly received hypothesis respecting the origin of the flower. I should leave my examination of the flower incomplete, as well as fail to give some information respecting it which is curious, and of considerable practical importance, should I pass on without giving, at least, an outline sketch of this theory. If any one will advance a more probable theory, or one, which agrees better with known facts, I for one, will give up the present theory, so soon as I am satisfied that such is the case.

This theory may be briefly stated thus: A flower, and all that springs from it, is nothing more than a transformed branch, including under the term branch, not only the axis or stem, but also its appendages, the leaves. This transformation is supposed to take place by the abortion, degeneration, or adhesion of the different plants of a branch. In supposing the transformation to be effected by the operation of these three several causes, we are not assigning any other causes than those which we see in operation every where around us. The term abortion, would seem to mean, that a part soon after its original formation, became deformed, and ceased to have the power of further developement; but such is not the sense in which botanists use it. "By abortion, they mean, the non-appearance of an organ at the place where one would expect that it would appear, and where, in fact, it would be found if the structure were regular." Instances of abortion in the organs of vegetables, must be familiar to every one at all in the habit of observing nature. Degeneration, consists in a part being less fully developed than is natural. Degeneration is a much more frequent source of alteration in the appearance of plants than abortion. That the different parts of a plant may degenerate, we have proof in the falling off both in quality and quantity of those which are cultivated by man, when they grow in circumstances unfavorable to their full developement. The operation of this same cause may often be detected, where at first thought we would not suspect it. The thorns on a wild crab apple-tree, are nothing but degenerate branches; that such is the fact is proved by an examination of their position and structure. They are situated just at the points at which branches would normally have appeared. They always, whilst young, bear leaves, and these leaves are situated with respect to each other just as the leaves on a branch are. But the most satisfactory proof is afforded in the fact that when one of these trees is removed, and placed in circumstances more favorable to its growth, not another thorn will be produced upon it, and often its old thorns will be converted into true branches. Adhesion, or the growing together of parts, is a much more common source of alteration, than either of the other two. Of the operation of this cause we have instances in the accidental growth together of two cucumbers, or of two apples, or of two or more stems which have sprung up very near to each other. Indeed the life of every graft depends upon its adhesion to the stock. In assigning abortion, degeneration, and adhesion as causes by which the transformation of a branch is effected, it is evident we are not assigning causes which are merely suppositious ones; but such as we do, in fact, see in operation around us.

But are the changes, which it is necessary that a branch should undergo, in order to be converted into a flower, such as we ever see to take place in plants? In answer to this question, it might be sufficient simply to mention the well-established fact that any branch of a steril tree may be made to produce flowers and fruit by removing a ring of its bark near the point at which it is inserted in

the stem, and this after the leaf-buds have begun to be formed. Or, to state the case a little differently, but in a way in which it has often been put to the test of experiment, and uniformly with the same effect—two young apple trees may be growing side by side, trees which if left to themselves will never bear fruit before the 7th or 8th year; if from one of them a ring of bark be removed near the root, and not from the other, the succeeding summer the first will bear flowers and fruit, whilst the second will not; and the flowers and fruit of the one will be found on just those parts of the stem where branches have grown on the other. Now this effect will be produced if the ring of bark is removed after the buds have begun to be formed. In this case it is evident that those buds which in ordinary circumstances would have produced branches, have been actually converted into flowers and fruit.

Let us now inquire what are the changes which it is necessary that the leaves should undergo in order that they may be converted into the different organs of the flower and fruit. In order that a number of leaves may be converted into a calyx, a change in position is necessary, and generally a slight change in form. If we take two pairs of opposite leaves, and suppose the internode, or part of the stem which intervenes between them, to be destroyed, or what amounts to the same thing to fail to be produced, we shall have four leaves occurring in a circle around the stem. Let these undergo a slight transformation, and they will form a four-sepaled calyx. If we suppose them to adhere or grow together at their edges, for a part of their length, instead of a four-sepaled calyx, we shall have a four-parted one. In order that a number of leaves may be converted into a corolla, a change in color, and the same changes in position as in the case of the calyx, are necessary. A petal is nothing more than a refined leaf. Of the necessary changes in color, we have many instances in those organs which still remain leaves. The upper leaves of the balm (*melissa*) are always colored. The upper leaves of love-lies-bleeding (*amaranthus melancholicus*), are often of as deep and beautiful a crimson as the flower itself. It is not an uncommon thing in the tulip, to see one of the leaves growing near the flower, variegated with the same rich colors as the flower itself. In order that a leaf may be converted into a stamen, it is necessary that the expanded parts of the leaf on each side of the mid-rib should be abortive, and that the end of the mid-rib itself, should be developed so as to form an anther; and pretty much the same changes are necessary in order that a leaf may be converted into a pistil. The change of stamens into petals, and of petals into stamens, is one which very frequently occurs. The rose has naturally but four petals, or flower-leaves, as we see in the wild-rose and eglantine. All our double roses have been produced by the conversion of stamens into petals. It is very common thing to see a double rose with 30 petals; of these 30, 26 are metamorphosed stamens. In fact, in the double rose, we may often find the stamens only about half metamorphosed; having their anthers perfect but their filaments developed as petals. In some plants, this doubling proceeds so far that not only the stamens, but the pistils also, are converted into petals, as in the flowering-almond (*amygdalus nana*). In the double flowers of the flowering cherry we find the pistils actually converted into leaves. From the very centre of this curious flower, one and sometimes two perfectly formed green leaves make their appearance, by their position indicating that they are metamorphosed pistils. We sometimes meet with more remarkable transformations than these. In one instance, I have seen a stem growing from the very centre of a double rose and bearing a second rose upon its extremity. The germ of a pistil is the carpel, or fruit in the incipient stage of its growth. Of course, in the conversion of a pistil into a leaf, we have in fact at the same time an instance of the conversion of a carpel into a leaf. Thus it will be seen that the changes which this theory supposes are not so contrary to the common course of nature as we would at first be inclined to think; indeed that they are no other than such changes, as nature herself affords us numerous examples of.

Let us now attend to some of the consequences which must follow if this theory be true. 1st, it would follow that all the organs of fructification must have essentially the same structure. This conclusion agrees with the facts of the case as determined by examination. All the organs of fructification, the sepals, petals, stamens, pistils and carpel, consist of a vascular and a cellular system, arranged on essentially the same principles; the apparent difference arising principally from the more or less perfect developement of the cellular system. 2nd, that the number of organs of each several kind, should, in the same flower, be some multiple of each other. As all leaves are normally situated in whorls, and all the leaves of each whorl at the same height on the stem, and in the same situation with respect to the circulating sap, we would naturally conclude that all of the leaves belonging to the same whorl would be converted into the same kind of organs. The number of leaves in a whorl being definite, the number of organs of each kind, must be some multiple of every other. This is found to be true in a great number of flowers; thus the *hamamelis* (witch-hazle) has four sepals, four petals, four stamens and two pistils grown together at the base; the wake-robin (*trillium*) has three sepals, three petals, six stamens and three pistils; the cherry (*prunus*), has five sepals, five petals twenty or twenty-five stamens, and five pistils; the flower-de-luce (*iris*) has three sepals, three petals, three stamens, and three pistils, grown together at the base; the blood-root (*sanguinaria*) has two sepals, twelve petals, twelve stamens, and 2 pistils; the garden pea (*pisum*) has five sepals, five petals, ten stamens, and one pistil. When this, which is considered the normal structure of a flower, is departed from, the departure is to be ascribed to the abortion, degeneration, or adhesion, of one or more of the organs. In several flowers, belonging to the same natural division, we may notice a series of departures, thus seeming to evince a tendency towards the normal form; thus in the natural division of *scrophulariæ*, the *gratiola virginica* has five sepals, five petals, and two stamens; the *gratiola aurea* has five sepals, two stamens and two rudimentary stamens; the *digitalis*, five sepals, five petals, four stamens; the *pentotemmon*, five sepals, five petals, four stamens, and a fifth one imperfectly formed; the *verbascum*, five petals, five sepals, and five stamens. So generally is it true, that the number of each class of

organs is some multiple of every other, that the botanist in determining the Linnæan class to which any small flower belongs, often counts the petals, and not the stamens. 3rd, That the several organs of fructification are severally convertible into leaves; and *vice versa*, that leaves are convertible into the several organs of fructification. Of the truth of this conclusion, proof has been already given. The circumstance on which the conversion of a leaf-bud into a flower, and thus into fruit, seems mainly to depend, is the accumulation of a large quantity of nutritious matter in the part to which the bud is attached. The elaboration of this nutritious matter, as has been already mentioned, is performed by the leaves. Hence it is, that a hyacinth, if deprived of its leaves one year, will not blossom the next; but if its leaves are so fully exposed to the light and air that they go through their growth in uninterrupted health, and if at the same time, the flowers of the first year are removed, the bulb will blossom more finely than ever the second year; for, in this case, not only is a sufficient quantity secreted by the leaves, but the stock prepared for the previous year remains unexhausted, in consequence of the flowers, which would have consumed it, having been destroyed. After a hot and bright summer, when the leaves have been in uninterrupted action, and a great quantity of solid matter has been deposited in the stem, an abundant quantity of blossoms invariably results; while the reverse takes place after cold and gloomy summers, when the shoots produced are weak and watery. If a tree is barren, its branches may be rendered fertile, by depriving them of a ring of bark, near the point at which they are inserted into the stem; this interrupts the backward flow of the elaborated sap causes nutritious matter to accumulate above the place where the bark is removed, and thus brings on the formation of flowers. An apple tree when raised from seed, and left to itself, will not flower in less than 7 or 8 years. But if a tree one year old, be cut off and grafted upon an old bearing tree which is able to supply it with a large quantity of nutritious matter, it will bear the second year after it is grafted; so that in this way, in three years a plant may be made to bear, which under ordinary circumstances, would not flower in less than seven or eight.

While the previous accumulation of nutritive matter in the part to which a bud is attached, seems favorable to its conversion into a flower, and thus into fruit, the abundant supply of nourishment through the roots, at the time when the bud is opening, seems unfavorable. This is illustrated by the fact, that in wet and warm springs, a great number of the blossom-buds of pears and apples are converted into leaves and branches. We account for this, by supposing that the excessively rapid developement which they undergo, breaks up the whorls of their flowers, and by throwing an excessive quantity of sap into the organs destined for flowering, converts them into leaves.

Such is the commonly received theory respecting the origin of the flower, and such the facts by which it is supported. Whether we adopt this theory or not, this much seems certain; that a leaf-bud, soon after its formation, may be converted into a flower, then into fruit; and also, that a flower-bud, in the early stages of its growth, may be converted into a branch and leaves. This is a fact of great importance to these engaged in fruit-culture, and European gardeners have long availed themselves of the advantages which nature thus affords. It is much to be desired, that we had a series of accurate experiments, performed for the purpose of ascertaining all the circumstances which affect these metamorphoses. That which is known, I have attempted to give in the present chapter; but it must be confessed, that it is too uncertain to be entirely satisfactory.

Chap. XIII.

Seed. Their structure. Means of dispersion. Propagation of cryptogamous plants, effected by means of spores.

The structure of the seed is very simple. In its most perfect form, it consists of an external coat, generally thick and hard, surrounding a cellular mass in which the rudiments of a new plant lie imbedded. The office of the external coat or skin is evidently that of protecting the more important and delicate parts within it. To this, its thick and hard structure is admirably adapted. In some seeds, this skin, or shell as it is more commonly called, is perfectly smooth, as in the acorn; in others, it is irregularly furrowed, as in the peach stone; in others, it is cross-banded, so as to resemble net-work, as in the seed of the prickly poppy. The marking of the surface of seeds is greatly diversified in different species, often rendering the minuter kinds beautiful objects of microscopic observation. When a seed germinates, the young plant has to burst through this shell, and in every instance, we find provision made for this, in the formation of the seed. Where the shell is very hard, it is always composed of two distinct and separable valves, as in the stones of the peach and cherry. The means by which the shell is broken, is the absorption of water by the cellular tissue of the kernel, through a small opening left in the shell itself. The force with which cellular vegetable matter expands, during its absorption of water, is almost irresistable. The common method adopted in France, of splitting out mill-stones from the quarry, may be mentioned as an example. The method is this: holes are bored around the piece intended to be split out; into these wooden plugs are tightly driven, and things being thus arranged, water is poured upon these plugs. The cellular tissue of the wood absorbs this water, and with such irresistable force does it expand, as invariably to split out the piece of rock intended. On the shell of many seeds we notice a scar, left by the separation of the seed from its funicle, or the vessel which originally connected it with the parent plant, and through which it received its nourishment. This is termed the hylum, or more commonly the eye. It is very conspicuous in peas and beans, in which it has a different color from the remainder of the surface of the seed.

Next to this outer skin or shell, lies the albumen consisting of a mass of cellular tissue, filled with nutritious matter. This is intended for the nourishment of the young plant, before its roots are sufficiently developed to enable it to gain nourishment immediately from the soil. The albumen is frequently divided into two or more separate

portions, termed cotyledons. When the young plant protrudes from the ground, it sometimes carries these cotyledons with it, as in the garden bean, where they have the appearance of thick fleshy leaves. The most remarkable fact respecting the cotyledons is, that their number is found always to correspond to the structure of the plant which springs from them. The seeds of plants with acrogenous stems, such as ferns, have no discoverable albumen, and of course no cotyledons. Hence such plants are called acotyledonous plants. Those of plants having endogenous stems, such as the Indian-corn, have but one colyledon. Hence they are called monocotyledonous plants. Those of plants having exogenous stems, have always two or more cotylodons; hence these are termed dicotyledonous plants. The division of the vegetable kingdom thus indicated, forms the basis of Jussieu's natural system of classification—the natural system in common use among botanists at the present day.

Besides the shell and the albumen, a rudimentary plant, termed an embryo, always forms a part of the seed. This is the most important part of the seed, and for its protection, and future support, all the other parts are destined. The embryo makes its first appearance in the young seed, as a minute point or speck, in the midst of the pulpy matter of which the seed then consists. It afterwards gradually increases in size, deriving its nourishment from the pulp until it has assumed the appearance of an organized body, and reached its destined size. Having in itself, in a rudimentary state, all the essential organs of vegetation, viz., a root, stem, and leaves, it becomes a plant by the mere developement of its parts. When placed in circumstances favorable to its growth, it sends forth a root downwards, and a stem upwards, and feeding for a time upon the stock of food which the parent plant has laid up for it in the cotyledons, it strengthens and gains a firm foot-hold in the earth, and at length becomes a perfect plant. The embryo may be looked upon as a rudimentary plant, provided by the parent tree, with a certain stock of food, and thus sent forth into the world, to seek subsistence, and a home for itself.

Did the seed drop down from the plant on which they grew, and immediately bury themselves in the soil, great numbers would have to spring up in close contact, so that if they did not destroy, they would, at least, impede the growth of each other. This, however, is seldom the case; there is almost always some provision made for removing the seed from the immediate neighborhood of the parent plant, and dispersing them abroad in the earth. An examination of the means made use of for effecting this dispersion, presents a subject of interesting consideration. In some plants, the seed are contained in an elastic pod, or pericarp, which opening, when ripe, with a sudden jerk, scatters the seed to a considerable distance. Of this the Scotch broom (*spartium scoparium*) affords an example. During a dry day in August or September its pods may be heard snapping, at a very considerable distance. The wild touch-me-not (*impatiens fulgida*) affords another example. If its seed-vessel be touched when ripe, it at once bursts, and the valves, coiling themselves up, spring from the stem and scatter the seed around. The bursting of the pericarps of some species of pine, is also worthy of notice. The pericarp, which is a cone, remains on the tree till the summer succeeding that during which it was produced, the scales being still closed; but when the hot weather has commenced and continued for some time, so as to dry the cone thoroughly, the scales open with a jerk, ejecting the seed in every direction. But the *hura crepitans*, a plant of the West Indies, affords the most remarkable instance of this. "If the bony pod of this plant be bound with several folds of strong cartridge paper, it will, so soon as it become thoroughly dry, burst with force sufficient to tear this paper in pieces." We observe a different means of dispersion in the barley (*hordeum.*) "The awn of the barley grain, which is beset with a multitude of little teeth, all pointing towards its upper extremity, effects the movement of the grain away from the place where it fell. For when the seed with its awn falls from the ear, and lies flat upon the ground, it is necessarily extended in its dimensions by the moisture of the night, and contracted by the drought of the day; but as the teeth prevent its receding in the direction of the point, it is consequently made to advance in the direction of the base of the seed, which in this way, is often carried to the distance of many feet from the stalk on which it grew. If any one is yet skeptical respecting the travelling capacity of the awn, let him only introduce an awn of barley, with the seed uppermost, between his coat and shirt-sleeve at the wrist, when he walks out in the morning, and by the time when he returns to breakfast, if he has walked any considerable distance, he will find it up at his shoulder. This journey has been effected by means of the continued motion of the arm, and consequently of the teeth of the awn, acting as feet to carry it forward."

Where seed are to be dispersed to a great distance, nature makes use of the agency of winds, streams, ocean currents, and living animals. The agency of winds is one of the most effective of these modes of dispersion, and in the case of many seeds, we may notice in their structure, peculiarities fitting them for being scattered in this way. The seeds of mosses, lichens, and fungi, are so exceedingly minute, that they float with ease in the air, and vegetate wherever they meet with a suitable soil. The seed of the white poplar (*liriodendron tulipifera*) are furnished with a wing, so that when falling from the tree, they are caught by the wind, and carried to some distance. The seed of the maple (*acer*) and elm (*ulma*) are fitted for this mode of dispersion, by the structure of their capsules, which are furnished with membranaceous wings, and of course are affected by the wind, in the same way with the seeds of the white poplar. The seeds of the dandelion (*leontodon taraxacum*) and thistle (*cnicus lanceolatus*) are terminated by a slender stalk, supporting a tuft of fine hairs at its extremity. This tuft of hairs is eminently hygrometrical, spreading out in dry weather, and collapsing again when the atmosphere is damp. In consequence of this spreading of the hairs, so soon as the seed are ripe, they are broken off from the stem, and thus the more easily taken up and borne along by the wind; but so soon as a drop of rain strikes one of them, the tuft of hairs immediately collapses, the seed falls to the ground, and is imbedded in the soil, in circumstances the most favorable to its future growth. The seed of the curly-head (*clematis viorna*) are

furnished with a long plumose tail, which serves to scatter them in just the way in which the tuft of hairs does those of the thistle.

The instrumentality of streams, rivers, and ocean currents, and a further means, are made use of by nature, for the dispersion of seed. The mountain stream washes down to the valley the seed which may accidentally fall into it, or which it sweeps from its banks during a freshet. The river, winding along through extensive portions of country, conveys to the distance of many hundreds of miles the seeds of plants which have grown at first only at its source. On the islands in James river at Richmond, there is no more common plant than the *tradescantia*, a plant which properly belongs to the mountainous regions in which that river takes its rise. That the seed from which these plants have sprung, must have been floated down by the river, is evident from the fact, that in eastern Virginia they are found no where except on the islands in this river, and along its banks; whilst they grow in great profusion and luxuriance in the part of the country in which the river takes its rise. "The southern shores of the Baltic, are visited by seed which have grown in the interior of Germany, and the western shores of the Atlantic by seed from the interior of America. Fruits indigenous to America and the West Indies have been found on the western shore of Europe, and even on the coast of Orkney and Shetland, evidently carried thither by the ocean currents."

Another very common means made use of for the disperson of seed, is the instrumentality of animals. Many seeds are carried to a distance from the place where they grew, by attaching themselves to the bodies of animals, who have accidentally come in contact with them, whilst in search of food; the hooks or hairs with which either the seed, or the pericarp is furnished, serving as instruments of attachment, the seed thus fastened upon the animal, being carried about with it until it is detached by some means, and committed to the earth. This is exemplified in the beggar's-tick (*bidens*) where the hooks are attached to the seed itself; in the bed-straw (*galium,*) where they are attached to the pericarp; and in the burdock (*arctium,*) where they are attached to the general calyx. Many seed are dispersed by animals in consequence of their pericarps being used as food. This is often the case with cherries, and the berries of various plants, which birds often carry away, until they meet with some convenient place for devouring the pericarp, and then drop the seed into the soil. So also seed are dispersed by such animals as the squirrel, who hoard them up for their winter's food. Sometimes the seed are hoarded up in the earth itself, in which case some of them will generally be found to take root and spring up into plants; though it has been noticed that ground-squirrels often deprive the seed of its germ before depositing it in their holes, as if apprized of its liability to grow in such a situation as that in which they place it. The Indians assert that all the oaks of this country have been planted by squirrels. The seed is frequently taken into the stomach of the animal, and afterwards deposited in the soil unhurt. This is the case with the seed of the mistletoe, (*viscum,*) which the thrush swallows, and afterwards leaves upon the boughs of such trees as it may happen to alight upon. The same is the case with the seed of the poke-berry (*phytolacca decandra,*) which are eaten in great numbers by black-birds and robins. It seems indeed surprising, that any seed should be able to resist the heat and digestive action of the stomachs of animals, and yet it is an undoubted fact that they do. Some seed seem even to require it. It is stated by an English botanist, that the seeds of *magnolia glanea*, which have been carried to that country, have generally refused to vegetate until after undergoing this process. It is known that some seeds will bear a great degree of heat without injury. "Spalanzani mentions some seed that germinated after having been boiled in water; and Du Hamel gives an account of some others that germinated after having been exposed to a temperature of 235° Fahrenheit." It is stated by Mr. Cleghorn that "a farmer in the west of Scotland has been in the practice, for some years, of feeding his cows upon potato-balls, and using their dung; raising seedling plants from it, the seed having passed through the stomachs of the cows, without having undergone such a change as to prevent their vegetating."

That all the more perfect plants are propagated by means of their seed, is a fact so abundantly proven by experiment and observation, that it can no longer be called in question; but that the same is true of the more imperfect plants, such as ferns, mosses, lichens, fungi and sea-weeds, is not equally certain. As such plants produce no regular flowers, and possess none of those organs of fructification by whose instrumentality the seeds of more perfect plants are produced, we would naturally expect, that if they produced seeds at all, they would be of a nature entirely different from those to which we have already attended. That nature has not neglected the means of reproducing these plants, however, is plain, from their great abundance in favorable situations. On examination we find that although they do not produce regular seed like the more perfect plants, they nevertheless, produce that which answers the purpose equally well. The bodies by means of which they are reproduced, are termed *spores* or *sporules*. In the case of the more perfect flowerless plants, that these *spores* act precisely like seed in reproducing the species, there can be no doubt; for if those from the back of the leaves of a fern, or from the urn of a moss be sown, as has often been done, they uniformly produce the same species as that from which they were derived. Spores differ from regular seeds, both in their structure, and in their mode of growth. Instead of possessing a regular germ, divided into *plumule* and *radicle*, to which one or more cotyledons are attached, they are mere homogeneous masses of cellular substance; and indeed, sometimes consist of a single cellule. When they begin to grow, instead of growing from one fixed point of their surface upwards, and from another downwards, they are capable of sprouting from any part of their surface indifferently; that portion of the suface which is exposed to the light, extending into a stem, and that which is turned from the light, becoming a root. "Mirbel, in his experiments on *marchantia*, ascertained that it was possible, up to a particular period of the growth of the spores of that plant, to induce the parts which they had developed to change their functions; the rudimentary stem taking on itself the

office of a root, and the new-born root becoming a stem, when their situation was inverted."

With respect to the more simple forms of vegetation, such as fungi, lichens, and sea-weeds, this matter is involved in greater mystery; some botanists believing them to be produced by a sort of equivocal generation. In their opinion, there is a common vegetable matter, consisting of simple globular cellules, each of which is possessed of the vital principle, and capable of growing into a new plant. But whilst they allow to these cellules the power of growing into new plants, they contend that the particular species of plant into which any one of them shall grow, is determined, not by any thing in the cellule itself, but by the particular circumstances in which they are developed; "that such cellules, if called into life upon a bare wall, become lichens; in a dark cellar, fungi; in the skin of a plant, parasites, and in water, *conferva*" or sea-weeds.

In favor of this opinion such arguments as the following are adduced. That a conferva is never found in any other medium than water, and a lichen only in air. Many forms of matter, it is said, uniformly produce the same species of plant; for example, decayed cheese, which has always the same blue mould, or fungus. The parasites which grow upon the rose, and many other plants, are always confined to particular species, and sometimes to particular organs, those of the bark not being always the same as those of the leaves. If one of these plants is examined microscopically, it will generally be found a mere mass of cellules, exactly like the spores or reproductive cellules. It is further asserted, that the power of reproduction is not confined to the spores, but exists in all the cells of which these plants are composed. "If we add to these considerations, the singular fact, that man holds, as it were, in his hands, the power of creating these things at will—at least in the case of the common mushroom, which will always be produced by a mixture of decayed and earthy matter—it cannot be denied that a strong *prima facie* case is made out by those who doubt the specific power of reproduction in the spores of the lower tribes of plants,"

In answer to these arguments it is urged, by those who hold a different opinion, that it is by no means certain that all these statements are true as matters of facts. The imperfection of our means of observation may lead us to confound forms of matter which are essentially different; and also, to separate forms of matter whch are essentially the same. It has lately been shown, that many of the so-called parasites are nothing more than morbid conditions of the cuticle of plants; and moreover that the separation of the different orders of these plants into species, is in very many cases, erroneous. As to the assertion that the power of reproduction is possessed by other parts of the plant besides the spores, it is plain that no certain information can be obtained respecting this matter, unless some way of effecting a perfect separation of the spores from the part experimented on, can first be devised, and no one pretends to have discovered such a way as yet. On this subject, Prof. Lindley remarks "surely it is more philosophical, more conformable to what we know, to ascribe these phenomena to myriads of microscopic spores, floating in the atmosphere, and dispersed by currents of air wherever that air can penetrate; and those who are practically acquainted with the nature of spores will be the least likely to question the probability of this; for they best know how inconceivably minute, and how infinitely numerous these spores are. Even the most common observer may form some notion of the fact, from the calculation that millions must be contained in a single puff-ball; and that many hundreds of these reproductive organs, are emitted by every microscopic head of the common blue mould of cheese. Let us not then be led astray, by specious theories and imaginary facts concerning bodies so far beyond the cognizance of our senses; but in the absence of demonstrative evidence to the contrary, let us believe that the great author of nature is consistent with himself in all his works, and has taken care to enable the most humble fungus to be multiplied by means as certain and unchangeable, as is provided for the stateliest oak of the forest. We may rest assured, for all philosophy, and all observation, and all reason prove it, that there is no such thing in nature as blind chance; but that all things have been carefully and wisely designed, with reference to the particular circumstances in which they exist."

Chap. XIV.

GERMINATION. CHEMICAL CHANGES WHICH TAKE PLACE. CIRCUMSTANCES FAVORABLE TO GERMINATION. CIRCUMSTANCES FAVORABLE TO THE PRESERVATION OF SEED. MATURATION OF FRUIT.

Germination is the process by which a new plant originates from the seed. The phenomena which are presented during germination may be divided into physical and chemical. The physical phenomena have been already adverted to. The most important of them are, the production and developement of the young radicle downward, and the extrication of the plumule and its developement in the air. The chemical phenomena we will now examine more particularly, for the purpose of ascertaining what circumstances are favorable, and what unfavorable to germination. The change which is produced in barley (*hordeum*) by the process of malting, is nothing more nor less than the germination of the barley. From an analysis of malted and unmalted barley made by Proust, their composition is as follows:

One hundred parts		of barley	of malt
Contain of	resin	1	1
"	gum	4	15
"	sugar	5	15
"	gluten	3	1
"	starch	32	56
"	hordein (a proximate principle peculiar to barley)	55	12

From an inspection of the results of this analysis, it will be seen that the principal chemical change which takes place, during the germination of the seed, consists in the conversion of hordein into starch, gum, and sugar, so that from an insoluble material, (for hordein is insoluble in water,) which could not in that state be applied to the use of the young plant, two soluble and highly nutricious

principles result, which, by being soluble in water, are easily made use of by the plant. The production of sugar in this case, identifies the change which the seed has undergone, with what is termed the saccharine fermentation. The circumstances which are favorable to the production of the saccharine fermentation in vegetable matter, are well known; they are, a temperature from 60° to 70° Fahr., the presence of moisture, and the free access of atmospheric air. Let us see how far observation will justify us, in applying the remark to the germination of seed.

1st, With respect to the temperature best adapted to the germination of seed. No seed has ever been known to germinate at or below the freezing point; hence seed do not germinate in winter, even though lodged in their proper soil. The temperature most favorable to germination, varies widely in different species; seeds being known to germinate at almost every temperature between the freezing and boiling points of water. Nearly all plants indigenous to temperate climates, require a temperature of at least 50° Fahr. for germination; the precise temperature in each varying with the peculiar constitution of the species; a circumstance which explains the regular succession noticeable in the leafing of different trees, and in the appearance of annual herbaceous plants, during the spring and summer. We are not, however, to infer from this that the particular temperature at which the seed of any plant usually germinates, is the most favorable which is possible for its germination. Adanson found that seed which will germinate at ordinary temperatures in the space of twelve hours, may be made to germinate in three hours, by exposing them to a greater degree of heat.

2nd, The presence of moisture. Seed will not germinate if they are kept perfectly dry. Water, or some similar liquid, is essential to germination; hence seed sown during a drought will never grow until the rain has moistened the ground in which they are deposited. But the quantity of water present is not a matter of indifference; for it is found that if there be two much water present the seed will rot. The quantity of water required by different seeds is not the same. Some can bear but *little* water, whilst others will germinate when *partially* immersed, as has been proved by an experiment of Du Hamel, at least in the case of peas. When he placed peas so that they should be about half immersed in water, he found that they germinated as freely as if placed in the soil; but much more than this they could not bear, for when totally immersed they rotted. There are some seed however, which will germinate when totally immersed, as must necessarily be the case in the seeds of aquatic plants.

3rd, The access of atmospheric air. Seed will not germinate if placed *in vacuo*. Ray introduced some seed of lettuce into the receiver of an air-pump, and having exhausted the air, he let them remain for some time, but no germination ensued; he then readmitted the air, and the seed germinated after the usual period had elapsed. It has also been ascertained by experiment, that seed will not germinate either in nitrogen, carbonic acid, or in hydrogen gas; and hence we conclude that it is the oxygen of the atmosphere which is essential to germination.

The influence of light, which is so favorable to growth in all the subsequent stages of vegetation, is injurious to the germination of the seed. Sennebier has proved that a seed germinates more rapidly in the shade, than in light, and in diffused daylight, than when exposed to the direct rays of the sun. The reason of this is, that light effects the fixation of carbon in the tissues, a hardening process, exactly the reverse of that which takes place in germination. Soil is by no means essential to the germination of seed; the requisite nourishment for the young plant during the first stages of its growth being deposited in the seed itself at the time of its formation. The embryo requires only the joint influence of air, moisture, and a proper temperature, to enable it to grow, and appropriate this nourishment to its own use. Yet soil, in consequence of its mechanical texture, permitting, as it does, the free access of air, and excluding the light, is very favorable to germination. Besides these circumstances, it is generally necessary that the seed should have reached full maturity in order to germinate well. This however is not always the ccse. The seed of the sacred bean of India (*cyamus nelumbo*) will sometimes germinate whilst it is yet in the capsule and connected with the parent plant. The same is true of the seed of the mangrove, a tree which grows along the borders of the sea in tropical countries. Whilst the seed of this plant is yet in the pericarp, its young radicle pierces the seed vessel, and elongates until it reaches the soft mud in which such trees grow, where it takes root, and afterwards separates from the parent plant. These instances however must be considered as exceptions to a general rule.

The period necesary to complete the process of germination, is not the same in all plants, even where all the conditions necessary to germination are fulfilled. Some species require a shorter, and others a longer period. The grasses are among the number of those plants whose seeds germinate most rapidly, and rosaceous plants among those which germinate most slowly. The following table indicates the period of germination of a considerable variety of seed, as determined by Adanson.

Wheat - -	1 day	Cabbage -	10 days
Beans, mustard	3 "	Hyssop -	30 "
Lettuce - -	4 "	Parsley -	40–50 "
Melon, cucumber - - -	5 "	Peach -	1 year
Radish, beet	6 "	Rose - -	2 years
Barley - -	4–7 "		

When seeds are protected from the action of those agents which facilitate germination, they may generally be preserved for a long time; but even in the most favorable circumstances, they at length lose the power of germinating. The period during which seeds preserve their vitality, varies much in different species, and also in the same species, in different circumstances. An exposure of a few weeks is sufficient to destroy the vitality of many seeds; especially those which are covered with a thin and delicate skin. On the other hand, all hard bony seeds, such as those of the pea tribe, may be kept for many years, without material detriment to their germinating power. Seeds of the sensitive plant (*cassia nictitans*) have been made to grow after an interval of 26 years; and peas, taken from a collection of seed made by

Tournefort, where they had remained for more than 100 years, germinated quite freely.

The circumstances which seem most favorable to the preservation of seed, are; 1st, uniform temperature; 2nd, moderate dryness; and 3rd, exclusion of light; and the success with which seeds are preserved for any length of time will be found to depend very much, upon the attention which is paid to these three things. Seeds brought from India to England around the Cape of Good Hope, rarely vegetate well; in this case, their double exposure to the heat of the equator, and their subsequent arrival in a cold climate, are probably the cause of their death; for seeds brought over land from India, and therefore not exposed to such fluctuations of temperature, generally succeed well. Others again, which cannot be conveyed alive if exposed to the air, will travel in safety for many months, if buried in masses of clay, and rammed tight in boxes. Seeds buried deep in the soil, being removed from the influence of air and light, and subjected to the uniform temperature of the earth, often preserve their vitality for many years. Hence it comes, that when a waste field is cultivated, plants often spring up, which have not been known to grow in that situation, within the memory of man; and species, for many years lost to florists, occasionally spring up on the sites of old botanic gardens.

Immediately after the fertilization of the young seed, the ovary or pericarp undergoes a change. In some cases, it at first enlarges, then becomes cartilaginous and dry, and gradually changes from green to brown, or white, forming what is commonly called the pod or seed vessel. In other instances it increases in volume, becomes succulent, instead of drying up, often acquires the gayest colors, and becomes what we commonly term the fruit, that is, "a body which may be eaten, or which looks as if it might." The term fruit has a more extensive signification in botanical than in common language. It is applied to the full-grown ovary, whatever may be its size, form or texture, and whether it be edible or not. So long as the fruit retains its green color, it seems to act in a manner precisely similar to that of the leaf; and hence, those fruits which become fleshy or juicy, may be supposed to become so, in the same manner as the leaves of the prickly pear (*cactus opuntia*) do; *i. e.* from the accumulation of sap in their tissues. The various colors the surface of fruits assume during their growth, are probably owing to certain changes of the chromule, analogous to those which take place in leaves, just before their fall.

The process of maturation, or ripening, consists in certain chemical changes, to which the accumulated juices are subject, under the action of air, light, and a proper temperature. That it is not owing to the acquisition of new materials from the stem, is evident from the well known fact, that nearly all full-grown fruits are capable of ripening when separated from the stem. "This was also demonstrated in the most striking manner, by M. Tshudy, who succeeded in grafting young melons upon gourds, and the fruit of the tomato upon the stem of a potato; the fruits grew and ripened, preserving their own peculiar flavor, unaffected by the stock." When ripening commences, the acid of the fruit usually increases in quantity; and in some instances, as in the current, the cherry, &c., continues to increase until the fruit is matured. In other edible fruits, the acid after a time diminishes, and the quantity of sugar rapidly increases, as will be evident from inspecting the following table.

Apricots, when green contain	6.64	of sugar;	when ripe	16.48
Duke cherries	"	1.12	"	"	19.12
Green gage plums	"	17.71	"	"	24.81
Melting peaches	"	.63	"	"	11.61
Jargonelle pears	"	6.43	"	"	11.52

This sugar is probably produced by the action of the vegetable acids, upon the gummy, mucilaginous, and gelatinous matter contained in the fruit. "M. Couverchel has found, that if we treat apple jelly with a vegetable acid dissolved in water, we obtain a sugar, analogous to that of the grape; that the gum of peas, if treated with oxalic acid, and exposed to a high temperature, changes to sugar; and that tartaric acid, if mixed with the juice of green grapes, renders the latter saccharine." The change which fruits undergo during the process of cooking, and which renders them sweet, is probably produced in the same way. The alterations which fruits undergo after ripening, in most cases decaying, in others blighting, seem to depend principally upon the presence of oxygen gas. Bérard succeeded in preserving for several months, with little alteration, the fleshy fruits of several plants, by placing them in hydrogen or nitrogen gases.

(To be continued.)

OF LIME.

From the Edinburgh Encyclopædia.

Lime has been regarded by some as a manure, by others as a stimulus, which can only be profitably applied where the soil possesses some dormant principle of fertility that needs to be roused into action. In fact, the *modus operandi* of lime is imperfectly understood, though the greater part of agriculturists seem pretty well acquainted with its effects. It is sufficiently understood, that land which has been long in grass, contains much vegetable matter, and that the trouble and expense of liming it will be amply repaid to the cultivator; but the propriety of applying lime on old arable lands has been questioned, and with much justice, by the most part of practical agriculturists, and their doubts on that head are confirmed by the fullest experience. If lime were a manure, then it would be a noble substance for enriching and restoring fertility to lands that were worn out by a succession of corn crops; but as worn out land is not restored to fertility by the application of lime, we are warranted to rank it in a different class, or, to speak more correctly, as an article calculated to bring certain principles into action, which were previously possessed by the soil. This conclusion is sanctioned by experience; and experience is a far better guide than the most plausible theory.

Lime has been used with very great success in every part of Great Britain, though it is evident that the grossest errors have been committed in the after management of land to which lime has been applied; and, what is worse, that the extent of these errors was in direct proportion to the effect produced upon the soil by the application. This remark applies more to the former state of husbandry than to the present practice, because the former rule was to crop so long as the earth would

make a good return, without considering that a field, so treated, was not to be recovered for a century afterwards. Indeed, when lime duly operates, the whole powers of the soil are put in a state of requisition, and may be forced to act till the very soul of vegetation is extracted. It is scarcely practicable to restore fertility to land, even of the best natural quality, which has been thus abused; at least a considerable period must elapse before it can be restored to its original fertility; but thin moorish soils, after being exhausted by lime, are not to be restored. To lime them a second time, is not only a useless expenditure of labor and money, but also productive of serious mischief. Soils of this description, after a second liming, are apt to singe and burn the grain that is sown upon them, and even when dunged, not to make such a return as would have been rendered under different circumstances.

It is a difficult matter to say at what period the use of lime was first introduced into Britain; but as it was well known to the Romans, there is good reason to believe, that by this ingenious people, the use of it was first brought into practice in this island. Be that as it may, this mineral after undergoing the process of calcination, has long been applied by British husbandmen as a stimulus to the soil, and, in consequence of such an application, luxuriant crops have been produced, even upon soils apparently of inferior quality, and which would have yielded crops of trifling value, had this auxiliary been withheld. In fact, the majority of soils cannot be cultivated with advantage till they are dressed with lime; and whether this beneficial effect shall be considered as an alterative, or as a stimulant, or as a manure, it will be found to be the basis of good husbandry, and of more use than all other manures put together. Wherever lime has been properly applied, it has constanly been found to prove as much superior to dung, as dung is to the rakings of roads, or the produce of a peat mire.

From a pretty long experience, and considerable attention to the operation of lime, we are inclined to think that it acts both as an alterative and a stimulant, operating in the one case as a medicine, that changes the nature of the soil, and in the other, as rousing, or bringing into action, the vegetable powers contained in the soil, which without such an application, would have remained dormant and inactive. These opinions, we know are different from what have been maintained by several ingenious men on the subject; but they are supported by the result of numerous trials, undertaken to ascertain how, and in what manner, lime operated upon the soil, and whether it could be used in a hot or *effete* state with the most advantage. On these points, theoretical writers are apt to fall into mistakes; and therefore every theory not formed from facts, must be viewed as a romance which may amuse, but cannot instruct agriculturists.

The writer of this article, for a period of thirty years, has been in the regular habit of applying considerable quantities of lime; indeed few of his profession have used more of this useful article. In the majority of cases, the application has been highly beneficial to his interest, changing in a manner the very nature of the soil, and causing it to produce the most abundant crops; whereas in others, the article has been altogether useless, and in some instances the application has been followed by mischief instead of benefit. As most of these trials were executed upon a large scale, and upon soils of almost every different quality, more benefit may be gathered from a succinct account of them than from a long chain of argument. The trials are fairly stated, and the results may perhaps throw some light upon this abstruse subject

It is proper to premise, that a good deal of uncertainty prevails with agriculturists, respecting the application of this article; and that much dispute has taken place among those who have applied it only to one kind of soil, or who have not used it under different circumstances. Some have contended, that lime ought to be applied only when it is in a hot powdered state; and that when it becomes *effete*, the effects are comparatively trifling and unavailing. Others maintain, that grass land is the best bed for the reception of lime, while many of our most enlightened farmers strenuously affirm, that it is most judiciously used when the land gets a complete, summer-fallow. It would not be difficult to prove, that each class of disputants, in the view they take of the subject are equally in the right; and that they only condemn the system of others, because their own has turned out to be successful. Our opinion is, that, in every case where the land is constitutionally disposed to receive benefit from a calcareous dressing, *that is*, when it is refreshed by grass, or enriched by dung, it is of little importace, in respect of operation, whether lime is applied *hot* or *effete;* upon grass land, or upon fallow; and that convenience ought chiefly to be studied, when the most proper time for applying the article is to be ascertained. In point of economy, there can be no doubt, but that lime is most economically used, when laid upon land hot from the kiln; this mode also lessens the expense of labor considerably; consequently the practice of using it when *effete* is more expensive. It is obvious, however, that a choice of season is not always in the farmer's power; and that imposing necessity often obliges him to lay on lime when completely *effete*. Repeated trials, however, have convinced us, that its operations are equally beneficial in the one state as in the other; though the expense in the last case, as already said, is greater than in the former. With regard to the other branch of dispute, whether land in grass, or land in fallow, is the most proper bed for the reception of lime, we are of opinion, that the difference is immaterial. If grass land is clean, and if lime can be got forward at the time, the application will be as efficacious upon it, as upon the richest and best wrought summer-fallow.

That these things are not matter of opinion, we mean to show, by detailing the results of the trials made to ascertain the facts. To render these details more perfect, we shall mention the nature of the surface and subsoil upon which the several trials were made, and explain the state of the ground at the time; and, when necessary, the management practised for a series of years afterwards.

Field, No. 1. was soil chiefly composed of thin clay, some of it approaching to a moorish quality, *i. e.* mixed with peat earth; the whole incumbent upon a subsoil retentive of moisture.

This field had been in grass for several years, but yielded very poor returns. It was fallowed without taking any corn crop; and the lime which

was brought forward during the summer months, was applied in the following spring, previous to the seed-furrow being given. At that time, it was completely *effete*, and would hardly go from the shovels. About 45 Linlithgow barley bolls, or 280 Winchester bushels, as originally laid down, were applied to each Scottish statute acre.

First year—The crop was oats, but little benefit was discovered from the lime.

Second year—The ground began to ferment, which showed, that the lime was in action. The husbandry of flax being then in vogue, it was tried upon this field; and the crop was excellent, both in respect of flax and seed.

Third year—It was sown with gray pease after two furrows, which returned a great bulk of straw, but not much grain. The clay part of the field was now quite loose and free, while the moorish soil seemed more compact and firm.

Fourth year—Red wheat was sown, which turned out a bulky crop, though the season was adverse. The straw was hard, bright, reedy, and of great length. Perhaps the greatest quantity of dung applied at once, would not have produced such a crop.

Fifth year—The field was summer fallowed, but no dung was applied.

Here it may, with justice, be urged, that a great error was committed in withholding dung at this stage; and it is acknowledged, that a dose of manure, had circumstances permitted, could not have been more beneficially bestowed. In vindication of the management practised, we may only state that at the period in question, dung was a very scarce article upon the farm; and that many fields would not crop at all, if it was withheld. The one under consideration, appeared quite capable of carrying several more crops, without assistance; consequently viewing the economy of the farm as a whole, it was thought preferable to act in the manner described. Many things are eligible in general management, which cannot be individually executed; and, as in public affairs, a partial evil must often be committed to promote the general good.

Sixth year—The field was sown with oats, and produced a heavy crop both of straw and corn. Grass seeds were sown with the oats.

Seventh year—The field was despastured with cattle. The grass was but indifferent, which is a common circumstance upon new limed land; at least where a heavy dose is given. This induced us to plough it again, in the succeeding spring.

Eighth year—Oats were sown, which yielded a decent crop.

Ninth year—The field was thoroughly summer-fallowed and dunged, at the rate of sixteen double loads to the Scottish acre. Wheat was sown.

Tenth year—The crop of wheat was excellent, being not only bulky, but of fine quality.

Eleventh year—Oats and grass seeds were sown, and the ground surrendered to pasture. Since that time, it has been a few years under corn; and though the produce of these crops cannot, by any exertion, be made to equal those which are enumerated; yet the soil is evidently much improved in every respect, when compared with its original state, previous to the lime being applied.

Field, No. 2. was a real moorish soil, incumbent upon a close bottom, which had been overcropped after lime, by a former tenant.

We began with a summer-fallow, and applied a part of the same kind of lime which answered so well upon field No. 1. The lime, was laid on during a hard black frost, at the rate of 35 bolls, or 210 bushels per acre, and was then *effete*. Oats were sown; but the crop was a poor one, and the after attempts were not more successful. The stalk of the plant generally *singed* and decayed, after the strength of the seed pickle was gone; which is a sure proof of ground being worn out with lime. This will always happen, though in different degrees, upon all such land, unless a considerable quantity of dung is bestowed; which unfortunately, in this instance, was not the case.

Field, No. 3.—The soil was of a moorish quality, but superior to that of No. 2.

We fallowed the field out of grass, and applied lime hot from the kiln; but the consequences were much the same as mentioned in the preceding instance. The oat-crop looked brisk at first, but decayed daily, as the strength of the pickle was exhausted. Tried dung with a second fallow, when the lime appeared to operate in a trifling degree, but not to that extent as to repay the expense incurred.

Field, No. 4.—The soil was partly thin clay, the remainder of a soft sandy nature, but all upon a wet bottom.

This field had lain, for a great many years, in grass, and displayed no signs of having been previously limed. We applied the lime upon the grass surface, when it was *effete*, and ploughed for oats: the crop good. The lime did not come into full action till the third year, when pease were sown; and, for a number of years afterwards, the different crops taken were not inferior to those of the best in the field.

Field, No. 5.—The soil was chiefly a soft loam upon a wet bottom; which at any rate, had not been limed since the ridges were levelled and straightened.

We summer-fallowed this field, after a crop of wheat, and dunged it substantially, as it appeared to be in an exhausted state. We applied lime hot from the kiln, at the rate of 40 bolls, or 240 bushels per acre, which operated immediately. It is now sixteen years since the application; during which time, the field has been only three years in grass, and yet its effects have not ceased.

Field, No. 6—The soil was a strong loam incumbent upon clay, which had carried five crops of grain after being ploughed from old grass.

We summer-fallowed and dunged this field; applied lime also, which was laid on hot from the kiln, in the month of August, after six ploughings were given. The quantity applied was forty barley bolls per acre; which, in less than a month, occasioned a fermentation of the soil, something similar to what is produced by yeast upon unbaked bread. In another respect, the improvement made upon this field by lime was conspicuous. Barley could, with difficulty, be raised before lime was used; whereas, afterwards, fine crops of this grain were procured with facility. The ground was likewise much easier ploughed and harrowed than formerly, which is always a sure token of an improvement being accomplished.

Field, No. 7.—The soil was generally a thin sharp loam, a great part of it incumbent upon a close bottom. It had been three years in grass, and was sown down in good order; and, therefore,

was a proper subject for receiving lime upon the sward. There was reason to believe that lime had been applied by a former tenant, but this was not certain. After harvest, we laid on from thirty-five to forty bolls per acre, not thinking the soil required a heavy dose. It was partly hot, and partly *effete*, as generally happens at that season of the year.

First year, oats were taken; the crop good. Second year, drilled beans, with intervals of twenty-seven inches; the ground being twice ploughed before sowing, and four times horse-hoed; crop middling. Third year, wheat after one ploughing, which yielded a full average crop. Fourth year, it was under summer-fallow; to which 12 double loads of dung per acre were given. Fifth year, in wheat; crop excellent. Sixth year, in drilled beans, which were managed as above. Seventh year, wheat; crop above mediocrity. Eighth year, barley, with grass seeds, after three ploughings; which, though the season was adverse (1799), turned out a decent crop. Ninth year, under grass, which was pastured with cattle, and not inferior to any in the country.

It may be objected, that the above is hard cropping. This may be the case; but we are far from acknowledging that hard cropping, in certain cases, is inconsistent with good farming. The expense of lime in general is so great, that a necessity for hard cropping may be said to be thereby created. Besides, this necessity is increased by the general shortness of leases, which impedes every permanent improvement; and, in the usage of lime, calls for the utmost exertion of the tenant, that he may be reimbursed his extrordinary outlay and trouble.

Field, No. 8.—The soil was chiefly loam, though of different varieties, and mostly incumbent upon a close bottom.

This field, which consisted of fifty acres, had been cropped for time immemorial; and, when we entered to the farm, was so tired with carrying wheat, that is was scarcely worth the ploughing. It was therefore laid down to grass with all convenient speed. In this state it remained five years, when it was broken up again; thirty acres having been limed upon the sward, at the rate of forty barley bolls per acre. Some of the lime was laid on three years before ploughing, some of it two years, and the remainder a few days before the ploughs entered. Part of it was hot, part of it *effete;* but the effects over the whole field, even in the first year, were nearly the same; if there was any difference, the ridges last limed fermented most, but the crop was equally bulky wherever the lime had been applied; though, upon the twenty acres unlimed, the inferiority was evident. From this it appears, that it was not necessary to apply lime to grass land one or two years before it was broken up, as inculcated by several writers upon husbandry; a practice, at any rate, not reconcileable with economy, as much of the lime is washed off the surface, and carried away by rain before the ground is ploughed.

Field, No. 9.—The soil was chiefly thin clay, incumbent upon a bottom of till; consequently, subject to receive injury from wetness. This field had been severely scourged by the preceding tenant; had been injudiciously straightened, which is a fatal measure to such soils; had been limed previous to the straightening; but, at our entry, was wholly under crop, and in an exhausted state.

After being summer-fallowed, in as perfect a way as circumstances permitted, this field was laid down in grass, and depastured with cattle for several years. Lime (the greatest part of which was in an *effete state*) was applied upon the sward during the winter months; and, in February following, the field was ploughed for oats. The crop was middling good; but, in the six subsequent years, it did not appear that much benefit was gained from the application. In the eighth year, however, the lime acted vigorously; a small part of the field which remained unlimed being at least 50 *per cent.* inferior in crop, though the management, in every other respect, had been similar.

It is difficult to account for this cessation of action during so long a period, though it is believed that instances of the like nature are not unfrequent upon secondary soils. Whether a deeper ploughing had been given in the preceding season which might bring the lime to the surface; or whether the original poverty of the soil precluded the lime from operating, till it was assisted by a copious application of dung, are circumstances not easily ascertained. In our opinion, the lime was brought into action by the dung bestowed; though it would be rash to state, as a matter of fact, what, at best, is only a probable conjecture.

Field, No. 10.—The soil was of various qualities. Part of it a thin loam, part of a sandy nature, and the remainder approaching to a thin clay; but all upon a bottom retentive of moisture. After pasturing the field for one year, we applied lime upon the sward, at the rate of 40 Linlithgow barley bolls, or 240 bushels per Scots acre. The lime was partly hot; but the greatest part of it was *effete*, which must necessarily be the case when lime is *hutted*, unless the huts are completely covered. No difference, however, was discovered in the operation, from the state in which the article was applied.

First year—The crop was oats. The season being excessively dry, little benefit was got from the lime.

Second year—We fallowed the field completely, and dressed it with dung, at the rate of fourteen double loads per Scots acre.

Third year—We sowed barley and grass seeds. The crop of barley was very good.

Fourth year—The field was despastured with cattle.

Fifth year—It was ploughed for oats. Crop excellent.

Sixth year—We drilled the field with pease and beans, after two ploughings, which were managed as already described; the crop was of great bulk, and produced fully nine bolls per acre.

Seventh year—Wheat was sown, and the crop was excellent.

Field, No. 11.—The soil was of an inferior kind of loam, upon a close bottom. The year when this field was last under summer-fallow, we applied lime to a part of it, by way of trial. Dung was given likewise. We sowed barley and grass seeds. We took a crop of hay, and ploughed for oats. Every one of these crops was strikingly superior, where lime had been given; indeed, the superiority was recognizable at a considerable distance.

Field, No. 12.—The soil was chiefly a heavy deep loam; some of it a strong, tenacious red clay,

but almost wholly incumbent upon a close bottom.

We ploughed this field from old grass, and sowed it with oats. It was summer-fallowed in the second year, and dressed with lime, which was mostly applied hot from the kiln; being drawn from the cart in regular sized heaps of five pecks each, or thereby, and spread the moment it was slaked by rain, or atmospherical moisture. About two-thirds of the field received 50 barley bolls, or 300 bushels per acre; the remainder from 60 to 70 bolls per acre; and the operation appeared to be in direct proportion to the quantity applied; nor was there any distinction discernible, betwixt what was applied hot, and what was completely *effete;* some of it, indeed, the season being remarkably wet, was nearly in a mortar state: the whole answered well, and operated immediately.

It was noticed, in this field, that a few ridges, on which the lime was spread in a windy day, carried crops rather inferior to those of the contiguous ones: we apprehend that the most valuable particles of the lime had been carried off; and would recommend, that spreading should be discontinued, when a high wind arises.

Much difference of opinion having prevailed, relative to the quality of the several limestone quarries in the neighborhood, a trial was made of lime from each of them, upon six adjoining ridges of the above field. Though a difference to the eye was visible in almost every one of these samples, yet the effect upon the ground was, from all of them, precisely similar; nor could the most accurate judge say which was the greatest. The quantity applied in each case was the same; and the operations of laying on the lime, spreading it, and ploughing the ground, were all carried on in an uniform manner.

Field, No. 13.—Consisted of loam of different varieties, upon a bottom inclined to wetness, and the ridges lying in a broad and serpentine state.

We ploughed for oats, and then took drilled beans, which were succeeded by wheat. The first and last crops suffered much from the grub. We fallowed the field in the fourth year, cleaving in different breadths, and cross ploughing the ridges, alternately, till the surface was completely levelled; then formed the ground into eighteen feet ridges, applied twelve double cart loads of dung, about one ton each, and fifty barley bolls of lime, to the Scots acre. The lime was laid on hot from the kiln, and spread as fast as it was pulverized. This quantity was found rather too much for the softest part of the field, which, after all, is a circumstance that rarely happens; but on the remainder the fermentation was not greater than necessary; and from this part of the field, the best crops have been procured, though the ridges were both higher and broader, and required more levellings than the other.

We may now draw a few plain and practical inferences from what is stated.

1st, That lime operates equally well, whether applied in a *hot* or *effete* state, provided the condition of the ground upon which it is used, be such as to render a calcareous application beneficial.

2dly, That, in respect of operation, it is immaterial whether the lime be used upon grass land or summer-fallow, and that objects of conveniency ought chiefly to weigh with the farmer in ascertaining the most proper time for applying this article. Upon old grass land, it is perhaps best to plough first, and to summer-fallow in the second year, when lime can be applied. On new and clean grass land, hesitation is superfluous; it may be limed at the outset, that is, before the plough is admitted.

3dly, That to lime moorish soils is a hazardous business, unless dung is likewise bestowed; but to repeat the application upon such soils, especially if they have been severely cropped, is almost a certain loss, and that a compost of lime and rich earth is, in such cases, the only substitute.

4thly, That strong loams and clays require a full dose to bring them into action; such soils being capable of absorbing a great quantity of calcareous matter. Lighter soils, however, require less lime to stimulate them, and may be injured by administering a quantity that would prove moderately beneficial to those of a heavy nature.

5thly, That upon fresh land, or land in a proper state for calcareous application, lime is much superior to dung. Its effects continue for a longer period; while the crops produced are of a superior kind, and less susceptible of injury from the excesses of drought and moisture. Finally, the ground, particularly what is of a strong nature, is much easier wrought; and, in many instances, the saving of labor would almost tempt a judicious farmer to lime his land, were no greater benefit derived from the application, than the opportunity thereby gained of working it in a perfect manner.

It may be added, that though strong soils require to be animated with a good dose of lime, those of a light texture will do equally well with little more than half the quantity requisite on the others, especially if they are fresh, or have not already received an application of calcareous matter. In every case it is the farmer only who can judge of the quantity to be given; but, as a general principle, it is safer to exceed the proper quantity than to be below it. In the latter case the application may prove useless, and the whole expense be lost; whereas it rarely happens that injury is sustained from an excess, especially if more or less dung is soon after administered.

PRICE OF DURHAM CATTLE.

From the Genesee Farmer.

Many consider it a sufficient proof of false estimate of the value of Durham cattle, that the price is ten times greater than the animals would bring as beef in market, or than their proceeds amount to in the dairy.

In deciding this point, it must be remembered that their value does not depend on their qualities for immediate use, but on their means of increasing the breed. Two things should therefore be considered in determining their price. 1. Their products for beef and the dairy; 2. The time required for them to increase so as to afford a general supply for the country.

1. To determine their value for *immediate* use, it is requisite that we know how much the proceeds exceed the cost and keeping. One cow may produce but one-half more milk than another, and yet be ten times more profitable. If, for instance, the cost of keeping be $15 a year in both instances; and the produce of one be sixteen, and of the other, nine dollars. This shows the great im-

portance of those animals which will produce the largest quantities of milk and butter. When it is considered that Durham cattle, for beef and the dairy taken together, are much superior to any other breed, their value for real use may in some degree be appreciated.

2. Suppose that their ultimate price will fall to only twice the present value of our common cattle, and that half a century will be required for them to increase sufficiently to supply the whole country, a little calculation will show the safety of paying ten times that amount for them *now* for the purpose of increasing their number. For when we remember the enormous increase from a single cow in that period of time, it will be evident that the present price of such an animal, though it be a thousand dollars, will bear an exceedingly small ratio to the ultimate value of her progeny.

This subject may perhaps be rendered clearer, by supposing an analogous case. Suppose that a variety of wheat may be obtained which will produce, with the same culture, five bushels more to the acre than our common wheat. Of course the farmer who sows a hundred acres, would gain by the use of such seed, from five hundred to a thousand dollars annually at the present price. In buying the seed, therefore, (two hundred bushels or less,) he could well afford to pay more than twice the common price of wheat. Consequently, in buying wheat for the exclusive purpose of growing for seed, he could pay twenty times the common price. Reasoning in this way, it will be seen that a single pint, for increasing as seed, would at first be cheap at a thousand dollars; and until the country were generally supplied, the price might safely be put at many times its ultimate value.

Analogous reasoning will show that the price of Durham cattle is not fictitious, but depends on their real value. J. J. T.

RECEIPT TO CURE AN EGG-SUCKING DOG.

From the Franklin Farmer.

Many a brave and good dog has lost his life by too great a fondness for eggs, to avoid which hereafter, take three grains of tartar emetic and a tea spoonful of grated or scraped Indian turnip, stir them well together in an egg, give it to your dog and he will ever afterwards turn off in disgust if you offer him an egg—a simple, safe and *certain* remedy. W. P. Hart.

MANAGEMENT OF BEES.

From the Maine Farmer.

Bees.—The following remarks on the management of bees, we copy from a small treatise on this subject by J. M. Weeks, of Salisbury, Vermont.

Bees swarm from nine o'clock in the morning to three o'clock in the afternoon on a fair day, differing in the season according to the climate. In Vermont they generally swarm from the middle of May to the fifteenth of July; in late seasons, some later. I have known them to swarm as early as seven in the morning, and as late as four in the afternoon. I have also known them to come forth when it rained so hard as nearly to defeat them, by beating down many to the ground which were probably lost from their colony: and I once had a swarm come forth on the sixteenth day of August.

I know of no rule by which the exact day of their first swarming can be known with certainty. The apiarian will estimate near the time by the number of bees in and about the hive, as it will become very much crowded.

The day of second swarming, and all after that during the same season, may be most certainly predicted as follows: Listen near the entrance of the hive in the evening. If a swarm is coming forth the next day, the queen will be heard giving an alarm at short intervals. The same alarm may be heard the next morning. The observer will generally hear two queens at a time in the same hive, the one much louder than the other. The one making the least noise is yet in her cell and in her minority. The sound emitted by the queens is peculiar, differing materially from that of any other bee. It consists of a number of monotonous tones in rapid succession, similar to those emitted by the mud-wasp, when working her mortar and joining it to her cells, to raise miss-wasps. If, after all, the weather is unfavorable to their swarming several days while in this peculiar stage, they will not be likely to swarm again the same season.

Experience and observation have taught that the queen leaves the old stock first, and her colony rapidly follow. They fly about a few minutes, apparentely in the greatest confusion, until the swarm is principally out of the hive. They then alight, generally on the limb of some tree, shrub or bush, or some other place convenient for them to cluster in a bunch not far from the old stock, and make their arrangements for a journey to a new habitation. Perhaps not one swarm in a thousand know where they are going until after they have left the old stock, alighted and formed into a compact body or cluster; and not then until they have sent off an embassy to search out a place for their future residence. Now if the bees are hived immediately after they have alighted, before they send off their embassy to seek a new tenement, they will never fly away, admitting they have sufficient room, (for it is want of room that makes them swarm in the first place,) and their hive is clear of every thing that is offensive to them.

No confusion or noise which is uncommon to the bees should ever be made during their swarming or hiving. The only effect of noise, ringing of bells, &c. that I could ever discover, was, to render them more hostile and unmanageable.

A clean hive is all that is needed for a swarm of bees, with careful and humane treatment.

A cluster of bees should never be shook or jarred any more than merely to disengage them from the limb or place where they are collected, nor should they fall any great distance, because their sacks are full when they swarm, which render them both clumsy and harmless, and harsh treatment makes them irritable and unmanageble.

When a swarm comes forth and has alighted, cut off the limb if convenient, unless a hiver is used—shake it gently, so as to disengage the bees and let them fall gently on to the table, board or ground, (as the case may be,) place the hive over them before many rise into the air, taking care at the same time to lay one or more sticks in such a manner as to raise the hive so as to give the bees rapid ingress and egress. If the bees act

reluctantly in taking possession of their new habitation, disturb them by brushing them with a goose-quill or some other instrument not harsh, and they will soon enter. In case it is found necessary to invert the hive to receive the bees, (which is frequent from the manner of their alighting,) then first, secure the drawers down to the floor by inserting a handkerchief or something above them; now invert the hive and shake or brush the bees into it; now turn it gently right end upon the table, or other place, observing the rule aforesaid.

GEESE AS BAROMETERS.

From the Quarterly Journal of Agriculture.

A recent tourist in the Highlands mentions a novel mode an inn-keeper had of ascertaining what would be the state of the weather:—"He has only to send his fleet of geese to the loch-side, and if they put out to sea, it will be fair; if they anchor on shore, it will be rainy."

MANUFACTURE OF CHEESE FROM POTATOES.*

From the Quarterly Journal of Agriculture.

Cheese, it is said, of extremely fine quality, is made from potatoes in Thuringia and part of Saxony, in the following manner:—After having collected a quantity of potatoes of good quality, giving the preference to the large white kind, they are boiled in a cauldron, and after becoming cool, they are peeled and reduced to a pulp, either by means of a grater or mortar. To five pounds of this pulp, which ought to be as equal as possible, is added a pound of sour milk, and the necessary quantity of salt. The whole is kneaded together, and the mixture covered up and allowed to lie for three or four days according to the season. At the end of this time it is kneaded anew, and the cheeses are placed in little baskets, when the superfluous moisture is allowed to escape. They are then allowed to dry in the shade, and placed in layers in large pots or vessels, where they must remain for fifteen days. The older these cheeses are, the more their quality improves. Three kinds of them are made. The first, which is the most common, is made according to the proportions above indicated; the second, with four parts of potatoes, and two parts of curdled milk; the third, with two parts of potatoes, four parts of cow or ewe milk. These cheeses have this advantage over other kinds, that they do not engender worms, and keep fresh for a great number of years, provided they are placed in a dry situation, and in well closed vessels.

PERFECT AGRICULTURE ADVERSE TO FENCES. NEW HERBAGE PLANTS.

From Loudon's Gardener's Magazine.

As the tendency of agricultural improvement in every country seems to be to stall-feeding, or, rather, to feeding in court-yards with sheds, instead of pasturing in fields, every attempt to make an addition to, or an improvement on, our herbage plants ought to be encouraged. Our idea is, that the time is not far distant when, in the best cultivated districts of Britain, the only animals pastured in the fields will be sheep; and that these will be folded on portions of verdant surface not larger than they can crop in a day or two, when they will be moved to a fresh portion. Hurdles or net-fencing will be used as substitutes for permanent fences; and then, of course, hedges and walls will no longer be wanted on most farms, except for an enclosure or two adjoining the farmyard. This will be a saving of the ground occupied by the fences, of their first cost, and of their annual keeping; while it will, at the same time, destroy the source whence are dispersed innumerable insects and seeds of weeds. In hilly countries and in valleys, which can be more profitably kept under perpetual grass than under the alternate system of herbage plants and corn, we do not say that fences will not continue to exist; but we have no doubt whatever of their sooner or later disappearing from all countries which can be subjected to the alternate husbandry; and more particularly where such countries have long dry summers, as is the case in most parts of the continent. On the greater part of the continent, indeed, there is no way of procuring manure sufficient for farming to advantage, but by consuming the herbage crops under cover, and saving and fermenting all the liquid matters produced in the farmyard and in the offices of the house. In this view of things, it will readily be conceived that we attach great importance to the improvement of old, or the introduction of new, herbage plants; and more especially of those tap-rooted or deep-rooting kinds which are adapted for countries having long dry summers. We have great pleasure, therefore, in introducing the following extract from the letter of an enlightened and scientific correspondent:—"I have four or five species of *heracleum* in cultivation, of the value of which I entertain great hopes, and some new grasses; one from Siberia. *Alopecurus nigricans*, seems to be valuable for its bulk and earliness, beyond most *gramineæ* whch we have hitherto had in cultivation. I think, too, that among several species of *sonchus hieracium*, which I am now trying, there are several which will be useful fodder plants on light silicious soil; of which, at a future time, when I see more about them, I may perhaps trouble you with an account."—*W. P. T. April 4th.* 1839. Any of our readers who have seeds of new herbage plants, or of plants which they think might prove useful as such, will greatly oblige us by sending a few, in order that we may forward them to our esteemed correspondent, W. P. T.—*Cond.*

SUGGESTIONS IN REGARD TO BUILDING FENCES AND LOG HOUSES.

To the Editor of the Farmers' Register.

Surry C. H., Va., May 28th, 1839.

I consider it a duty incumbent upon all, not only the farmer, but the doctor, lawyer, merchant and the mechanic, in short, every individual in the community, whatever his vocation may be, (as he is either directly or indirectly dependent for his support on the farmer,) to lend their aid in support of this all interesting subject, our mother agriculture.

* An earlier and more full account of this practice was translated from a Belgian journal for the Farmers' Register. See page 268, vol. i.—Ed. F. R.

This aid and support from the larger portion of the farmers, I mean the little farmers, those with little education, may be expected to be limited; they have not the ability to do much, if they have the inclination. Their plan is a kind of a rote, a monotony, the practices followed by their fathers, their grand-fathers, and their great-grand-fathers; they seek no improvement, but remain perfectly reconciled to their poor crops and their land-murdering systems. The idea of the study of chemistry, botany, vegetable or animal physiology, geology, &c. with them seems as foreign to their business as law or physic. But to the intelligent, the reading class of our citizens, we must look for support. But with this class, how entirely negligent they are of their real interests! How few out of the many who are able to assist in the cause, ever take up a pen in its behalf—that even give to the public eye, in our agricultural journals their experiments in detail, their inventions, their discoveries, or any idea relating to, or touching that branch of science?

I have no experience in farming, consequently what I might say upon that subject, would be of but little avail, and therefore should be little in words; and shall at present only offer some hints.

On the construction of garden and lot fences.—Upon which, I propose, as I think, an improved plan. It is this: after laying off the size and form of an enclosure, for paling, railing or common rail or worm-fences, plough up with a double-plough to the full depth or a little beyond the soil a space of six, eight, or ten feet in width along the course designed for the fence. Then remove the soil so broken up, to any contigeous spot, and this, though poor and no better than the land on which it is put, will prove a manure in effect, for the depth of soil, good or bad, is very important. And along this trench build the fence. The width of the excavation, will of course, depend upon the kind of fence designed to be constructed thereupon. The advantages to be gained by this plan are, I think, several. The absence of the soil would prevent the growth of noxious weeds, briers and clusters of vines, &c., so common about gardens, lots and other spots of good land; the paling by being thus sunk would be somewhat protected from the winds, from the influence of the shade produced by the thickets of weeds, &c. so destructive to all timber; and in excessive wet weather the excavation would serve as a drain and a reservoir for the excess of water, &c. &c.

The durability of cypress poles, for ordinary out-house building seems to be not generally known. Poles or logs of this timber are far preferable to any made use of in this section for that purpose. Those who take durability into consideration, when cutting poles, would be well paid for their additional trouble in procuring cypress, if possible to be had in their vicinity at a reasonable expense. A friend of mine has now, in good and sound condition, a stable that was built of these about twenty years ago; and other out-buildings of later date, promising equal lasting. It is said by some that the bark should remain on the poles; but this I consider not important; they are used here both with and without the bark, and with no visible difference as to lasting.

Our neighbors are too much of an office-seeking people, a fortune craving people, for good farmers. Catching at any and all offices and employments that will take their attention away from their farming operations, for, (as they seem to think) the more honorable distinctions of, Mr.—Esq.—Colonel—Major—Captain, &c., who make so bold and conspicuous a figure among us, the farmers, the little ones.

I have thus, in obedience to my well wishes I have for agriculture, attempted to contribute my little, toward the advancement of that great source of human support. Should you excuse the rough and hasty manner in which it is jumbled together, and consider it of any value to your readers, then give it a place in the Farmers' Register, and at some more leisure day I will offer some words on a subject better deserving your attention.

By the Register's reader,

D. C. R.

TWO-CROP SILK-WORMS. FIXTURES FOR FEEDING AND SPINNING, &c.

To the Editor of the Farmers' Register.

Stafford, May 22nd, 1839.

DEAR SIR—Yours of the 15th inst., is received, and I embrace the earliest leisure moment to reply to your several inquiries.

The variety of silk-worms called in the United States "two-crop," has been reared with success for many years in Connecticut, whence I originally procured my eggs. The eggs of this variety (if good,) invariably hatch twice, without the use of artificial means. Nothing more is necessary than to leave the eggs, procured from the first rearing, exposed where the moths have deposited them, and to notice them every morning between sunrise and 10 o'clock A. M. They usually hatch out in from three to ten days. Such as do not hatch (if any) cannot be relied on for the following year. Eggs for the latter purpose, must be procured from the second rearing. Eggs from other varieties sometimes hatch the same season, but they cannot be relied on for a second crop. I have never known this to occur but once under my observation, and then only four or five thousand hatched out of a lot of thirty thousand eggs.

The "two-crop" silk-worm moults *four* times; but in other respects it answers well to the description given by Dandolo of the *three-cast* worms. There is no worm as far as I have been able to learn, after diligent inquiry, in the United States that does not cast its skin *four* times.

The "two-crop" worm is hardy, stands atmospheric transitions better than most other varieties, and is not so liable to that terrible disease which the French called the *grasserie*. Whenever this disease breaks out in a cocoonery, it is vain to look for a tolerable result. It also spins a finer fibre, and for some purposes the silk produced commands from $1 to $2 per pound more than that from the ordinary varieties.

After three years spent in experimenting, I have adopted fixtures with which I am entirely satisfied. They are simple, economical, convenient, and (if I may use the expression,) meet the *instinctive views* of the silk-worms. I will describe them briefly.

I place pieces of scantling, extending perpendicularly from the floor to the joists, two feet apart, measuring across the cocoonery, and six feet distant, measuring lengthwise, leaving intervening

alleys of two feet four inches for those who attend the worms to pass. I then bore holes in the scantling, with a half-inch auger, twelve inches apart so as to have six hurdles, one rising above the other. Ropes are then drawn through these holes, upon which light and moveable hurdles, three feet long and two wide, rest.

As these ropes are supported by timber at intervals of six feet, they may be drawn through a cocoonery 100 feet long, and yet be kept sufficiently steady. I use ropes in preference to timber, because every square inch added to the vacuum in a cocoonery is of importance. My hurdles are made of common pine laths an inch and a half wide and three-eighths of an inch thick. Two of these laths are laid down two feet apart, and then three cross pieces, two feet long, are nailed to them with small wrought nails, one at each end, and one in the middle. On this frame strong brown paper, such as is used in hardware stores, is pasted. You then have an elevated surface, so that the air can pass freely over the worms.

Oak bushes with the leaves on, I consider the best accommodations for the worms to wind on. These bushes should be gathered about a week before they are to be used, and spread in the shade in order that the leaves may become somewhat curled. Whenever a considerable number of worms manifest the disposition to spin, all of that particular age in the cocoonery, should be speedily placed on clean hurdles and arranged near together. Oak bushes should then be placed on the right and left, resting on the hurdles and tied to the upright timbers. The worms usually go to the edge of the hurdle and crawl along, frequently throwing up their heads, in search of something to climb on. By this arrangement, you will see that whether they move to the right or left, they are almost sure to come in contact with the bush. Other bushes must be placed along on one side as they are wanted, one end resting on the hurdle, and the other tied to the rope or timber immediately above. One side must of course be left open to distribute leaves to such of the worms as are still inclined to eat.

At the expiration of six or seven days, all the worms in this division that have not risen, must be taken away and accommodated on other hurdles, and three days thereafter the hurdles may be taken down and the cocoons gathered. The oak leaves do not crumble and the cocoons come out clean and in very good condition.

Before spinning, the worms void all excrementitious matter; and frequently before this is done, they climb up and assume the position for spinning. Under these circumstances the oak bushes are admirable to protect the cocoons already formed below. The precocious as well as the tardy worms are generally feeble, and must have their accommodations furnished them so that they may have but little climbing to do, and indeed whenever any of the worms are found wandering in search of a position for spinning, they must be taken and placed on the hurdles, and then left to do as they are inclined.

The attendant should be at the cocoonery very early every morning to attend particularly to these wanderers because at that time their number will be greatest.

Before a general disposition to spin is manifested, it is a good plan to have a bush at hand to accommodate the precocious spinners, until a systematic arrangement can conveniently be made.

You perceive that net-work has no place in my catalogue of fixtures. The reason may be found in the following experiments: In the summer of 1837 I prepared a net-work frame, three feet long, and two wide; at one end of this frame I placed an oak bush, at the other 500 silk-worms ready to spin. Of these, 499 passed across the net-work and formed their cocoons in the oak bush. In 1838 I altered this frame, giving it, as I supposed, a more convenient form. Again a bush was placed at one end, and 500 silk-worms at the other; and of these 498 formed their cocoons in the bush. I consider these experiments as showing conclusively that the silk-worms have no inclination to be on net-work, and therefore, I have declined the use of such hurdles.

Respectfully yours,
LAYTON Y. ATKINS.

P. S. I have ansswered your queries as fully as is desirable, and if yon are inclined to publish the suggestions you can do so.

My silk-worms have not yet commenced spinning, but they appear to be doing very well. A few days before spinning, however, is generally the critical period, as to the breaking out of diseases.

I will venture to remind you of G. B. Smith's caution against "over-cropping," as new beginners are in danger of suffering by it. He says that we should be sure of having nearly double as much foliage as would sustain the worms brought out. Last year a gentleman at Washington lost his worms in this way.

Another injury which results from "over-cropping" is stripping of the trees too closely the first season; it has a very bad effect on the after-growth of the trees. The morus multicaulis is a very hardy tree; it is, nevertheless, governed as to its growth by the same laws which operate on other trees, and may be injured by excessive defoliation. The leaves should be taken cautiously while the stalks are green and succulent, indeed I should not venture to take any leaves earlier than 20th June, and then very sparingly. In order to be ready for early feeding, the tops must be left on the trees. I am aware that Dr. Stebbins and some others have said you may begin to take the leaves when the plants are one foot high, and that the trees are not injured by it. Dr. Stebbins also recommended that silk-worm eggs be put in bottles hermetically sealed, and placed in ice-houses. Those who followed his advice brought out their eggs and exposed them for hatching, but no worms made their appearance.

L. Y. A.

METHOD OF CAUSING CABBAGES TO HEAD DURING THE WINTER.

From the Maine Farmer.

In the fall of the year when it is time to gather cabbages, we always find more or less of them that have not formed any heads. They may have grown well and have a large stock of leaves, but have not closed up in the form necessary to make a good, solid, compact cabbage.

William Vance, Esq. of Readfield, has practised for many years the following method, which effectually closes these loose leaves in the course

of the winter, thereby furnishing him with a supply of the best kind early in the spring. In the fall of the year, just before the ground closes up he gathers all the cabbages which have not headed, together. He then digs a trench eighteen inches or more, deep, and of sufficient width to admit the cabbages. He then closes the leaves together by hand, winding a wisp of straw or something else around them to keep them together; and then puts them into this trench, with heads down and roots up. He then packs straw or leaves, and earth snug about them, and rounds up the earth over them. The trench should be dug in a place where the water of the rains and the snows runs off, and will not stand about them. A board, or a couple of boards, nailed together in the form of a roof and put over the mound, may be useful.

In the spring of the year open your trench, and you will find that your cabbages are all headed firmly together, and if the water has not got in, will be solid and hard, Mr. Vance, has had the goodness to send us a few heads which he has formed in this way, which were very nice. By following this plan, we not only preserve the cabbages well during the winter, but save much of the crop which is not considered worth much.

SAVING GREEN PEAS.

From the same.

Mr. Vance informs us that he preserves green peas for winter use, simply by shelling them and putting them into bottles, and corking them very tightly. They should be used as soon as the bottle is open. In this way you may have green peas all winter, if you like.

IMPROVED DURHAM SHORT-HORNS.

From the Whip.

For every portion of the text in this excellent account of the short-horns, we are indebted to the Rev. Henry Berry, than whom there are few more zealous breeders of cattle, while there is no better judge of them.

Whatsoever differences of opinion may prevail respecting the comparative merits of our several breeds of cattle, it must be admitted that the short-horns present themselves to notice under circumstances of peculiar interest. Possessing in an eminent degree a combination of qualities which have generally been considered imcompatible, and rendered irresistibly attractive to the eye by their splendid frames, and beautifully varied colors, it is not surprising that they have become objects of public curiosity; that they have realized for their breeders enormous sums of money; and that, throughout our own island, and in every foreign country where agriculture is attended to, they are in increasing request.

It might tend to throw much light on the science of feeding, could these animals be traced, in the progress of their improvement, to an earlier period than has hitherto been found possible. Of the extent of that improvement we may, however, form an estimate, by placing together one of the improved, and one of the unimproved race. We should, in such a case, discover resemblance just sufficient to support the belief in a very remote alliance, but there all similarity would cease.

From the earliest periods as to which we have any accounts of our breeds of cattle, the counties of Durham and York have been celebrated for their short-horns, but principally, in the first instance, on account of their reputation as extraordinary milkers.

Before this, a large and valuable description of cattle had existed on the western coast of the continent of Europe, and extending from Denmark to the confines of France. They were celebrated for the great quantities of milk which they yielded, and some of them exhibited an extraordinary aptitude to fatten. At what particular time they found their way to England, or by whom they were imported, is unknown; but there is a tradition that, towards the close of the seventeenth century, a bull and some cows were introduced into Holderness.

In external form, there appeared to be very little to recommend them, for they had large shoulders and coarse necks; the sides were flat, and the head was thick; all the coarse parts were bulky, and the prime ones were reduced in size, and they were almost the reverse of what the agriculturist would select: they were, however, bulkier than the native breeds, and they were better milkers than the generality of the cattle of that day. They would, by dint of feeding, grow to an enormous size; but they had not the aptitude to fatten, nor the early maturity, to which they have been since indebted for their triumph over every other breed. To recite their recorded feats at the pail would be to invite incredulity; but it may be asserted, on the best evidence, that, taken as a breed, they have never in that particular been equalled. The cattle so distinguished were always, as now, very different from the improved race. They were generally of large size, thin-skinned, sleek-haired, bad handlers, rather delicate in constitution, coarse in the offal, and strikingly defective in the substance of girth in the fore-quarters. As milkers, they were most excellent; but when put to fatten, as the foregoing description will indicate, were found slow feeders, producing an inferior quality of meat, not marbled or mixed as to fat and lean, and, in some cases, the latter was found of a particularly dark hue. Such, also, are the unimproved short-horns of the present day, and the distinction cannot be too frequently asserted, because they are, in many cases, considered as specimens of the improved breed, and have actually been resorted to in trials as to the comparative aptitude of animals to fatten—trials which it is evident they could not successfully sustain.

A period of more than eighty years has now elapsed, since the short-horns, on the banks of the river Tees, hence called the Teeswater breed, had assumed a very different character to that contained in the foregoing description. In color, they resembled the improved short-horns, being occasionally red, red and white, and roan, though the last named color was not then so prevalent as now. They possessed a fine mellow skin and flesh, good hair, and light offal, particularly wide carcasses, and fore-quarters of extraordinary debth and capacity. Perhaps no closer modern resemblance can be found to the above description of the Teeswater breed than Mr. Berry's bull presents. His dam was purchased by Mr. B. on account of the very few crosses that intervened between her

and some of the best of the Teeswater cattle, to which he was desirous to go back, on account of the extent to which breeding *in-and-in* has been carried. When slaughtered, their proof was extraordinary, and many instances are recorded of the wonderful weight of their inside fat.

The remarkable difference which existed between the Teeswater and the old unimproved short-horns may, with propriety, be ascribed to a spirit of improvement which had some time manifested itself among the breeders on the banks of the Tees, whose laudable efforts were well seconded by the very superior land in the vicinity of that river. No reasonable doubts can be entertained that they proceeded on a judicious system of crossing with other breeds, because it was utterly impossible to raise such a stock as the Teeswater from pure short-horn blood. One cross to which they referred was in all probability, the white wild breed; and if this conjecture be well-founded, it will be apparent whence the short-horns derived a color so prevalent among them.

It is also asserted that, about the period in question, Sir William St. Quintin, of Scampston, imported bulls and cows from Holland, which were crossed with the stock of the country. It would tend to little advantage to proceed with conjectures, as to what other breeds were resorted to, if any; this much is certain, that great improvement was soon manifested, and a valuable variety established, as the two following instances will prove.

Mr. Milbank, of Birmingham, one of the leading improvers, bred and slaughtered an ox, which, at five years old, weighed, the four quarters, one hundred and fifty stones, of fourteen pounds to the stone, producing sixteen stones of tallow; and a cow bred from his stock, slaughtered by Mr. Sharter, of Chilton, at twelve years old, weighed upwards of one hundred and ten stones.

From Mr. Milbank's time, the Teeswater cattle continued to sustain their excellence and celebrity in various hands, until Mr. Charles Colling adopted them, when he manifested a superiority of skill as a breeder, which, in a very brief period, secured him an ample fortune.

Whatever had been the merits of the Teeswater cattle, it is certain Mr. Colling greatly improved them; and though it has been asserted that his success was the result of chance, arising from the possession of an animal, with the merits of which, it is supposed, he was at one period unacquainted, the writer of this article is of opinion that Mr. Colling's success resulted from a deliberate and well-considered plan. He found the Teeswater, like all other extravagantly large cattle, frequently of loose make and disproportion. He was sensible, also, of the difficulty of breeding, with anything like certainty, *large good* animals; and though he has declined on all occasions to throw any light on his views and proceedings, the writer thinks he can detect, in the very outset, and through the progress of his practice, a resolution to reduce the size of this breed, and at the same time, and by that means, to improve its form. This he is supposed to have effected, in the first instance, through the medium of a bull, called "*Hubback*," an animal respecting which there has been much controversy, principally touching the purity of his blood, a question now of little importance, because it is admitted on all hands that Mr. Colling adopted another cross, which prevails in a majority of superior short-horns of the present day. It may, notwithstanding, be matter of interest to state a few particulars respecting this bull.

Without entering on an inquiry by what circumstances Hubback's title to be considered of pure blood is supported or weakened, it may suffice to observe, that it appears probable he possessed on one side the imported blood. The possessor of his dam was a person in indigent circumstances, and grazed his cow in the highways. When afterwards she was removed to good land, near Darlington, she became so fat that she did not again breed; and her son, having the same feeding propensity in a high degree, was useful as a bull during a very short period. The quality of the flesh, hide and hair, are supposed to have been seldom equalled; and as he was smaller than the Teeswater cattle, he was eminently calculated to forward Mr. Colling's views.

It has been remarked that we have at present no superior horse on the turf, which does not boast the blood of the Godolphin Arabian; so it may be asserted that we have no superior short-horns which do not claim descent nearly, or remotely, from Hubback; because Hubback was the sire of the dam of Mr. Charles Colling's bull, Foljambe, who was the grandsire of Favorite; and there can be no doubt that there has not been for many years any superior short-horn who was not descended from Favorite. Mr. Charles Colling is said to have considered that the bull Foljambe was the one who did his stock the greatest good; and this is not improbable, as Foljambe was the sire both of the sire and dam of Favorite. Hubback, however, must have been a remarkably good animal, and considering the short time during which he was used as a bull, proved himself a first-rate stock-getter.

The following account of Hubback we had from Mr. Waistell, or Alinill, who, although his name does not appear conspicuously in the 'Short-Horned Herd Book,' deserves much credit for his discrimination here. He used to admire this calf, as he rode almost daily by the meadow in which it grazed; and at length he attempted to purchase it from the owner. The price asked, £8, seemed much for a calf not a year old; and the reputation of the short-horns not being yet established, the bargain was not struck. Still he longed for the young beast; and happening to meet Mr. Robert Colling near the place, he asked his opinion of the animal. Mr. Colling acknowledged that there were some good points about him; but there was something in his manner of acknowledging this, which induced Mr. Waistell to suspect that Mr. Colling thought somewhat more highly of the calf than his language expressed, and, therefore, he hastened the next morning, concluded the bargain, and paid the money. He had scarcely done so before Mr. R. Colling arrived for the same purpose, and as the two farmers rode home together, they agreed that it should be a joint speculation.

Some months passed by, and either Mr. Waistell's admiration of the calf a little cooled or his partner did not express himself very warmly about the excellencies of the animal, and Messrs. Waistell and R. Colling transferred young Hubback to Mr. C. Colling; who, with the quick eye of an experienced breeder, saw the value of the little beast. Mr. Waistell expressed to us (Octo-

ber, 1832) his regret (natural enough) at having been induced to part with the sire of the short-horns, and his extreme disappointment that when Hubback began to cover, Mr. Charles Colling confined him to his own stock, and would not let him serve even one of Mr. Waistell's cows.

After the use of this bull, Mr. Charles Colling proceeded with singular success to produce, from time to time, superior animals; and the number of bulls he disposed of by letting was highly encouraging. But the circumstance which brought the improved short-horns into most extensive notice was the production of the "Durham Ox," an animal which speaks volumes in favor of even a single cross of this blood; for the ox was the produce of a common cow, which had been put to "*Favorite.*" At five years old, the Durham ox was sold to Mr. Bulmer, of Harmby, near Bedale, for public exhibition, at the price of £140; this was in February, 1801. He was at that time computed to weigh 168 stones, of 14lb, his live weight being 216 stones; and this extraordinary weight did not arise from his superior size, but from the excessive ripeness of his points. Mr. Bulmer having obtained a carriage for his conveyance, travelled with him five weeks, and then sold him and the carriage. at Rotherham, to Mr. John Day, on the 14th May, 1801, for £250.

	£. s. d.
On the 14th of May, Mr. Day could have sold him for - -	525 0 0
On the 13th of June, for - -	1000 0 0
On the 8th of July, for - -	2000 0 0

Mr. Day travelled with him nearly six years, through the principal parts of England and Scotland, till at Oxford, on the 19th February, 1807, the ox dislocated his hip-bone, and continued in that state till the 15th April, when he was obliged to be slaughtered; and, notwithstanding he must have lost considerably in weight, during these eight weeks of illness, his carcass weighed—

	Imp. stones.	lbs.
Four quarters - -	265	12
Tallow - - -	11	2
Hide - - - -	10	2

This was his weight at eleven years old, under all the disadvantages of travelling in a jolting carriage, and eight weeks of painful illness. Had he been kept quietly at Ketton, and fed till seven years old, there is little doubt but he would have weighed more than he did at ten years old, at which age Mr. Day stated his live weight to have been nearly thirty-four hundred weight, or two hundred and seventy stones, from which if fifty be taken for offal, it leaves the weight of the carcass two hundred and twenty stones.

It is a well ascertained fact, that, during his career as a breeder, Mr. Colling tried several experiments in crossing, and the breeds to which he resorted on these occasions, being very considerably smaller than the short-horns, this circumstance tends to corroborate the writer's opinion that he considered it desirable to reduce their size. The cross with the Kyloe led to no results worthy enumeration, but that with the *polled Galloway* must not be passed over without comment. Before stating the circumstances attending this experiment, it may be proper to observe that no breed of cattle promised so successful a cross with the short-horns as the Galloway. They were calculated, by their deep massive frames and short legs, to bring the short-horns nearer the ground, and to dispose their weight in a more compact manner: their hardy habits would be essentially useful, and the quality of their flesh and hair were such as to render the experiment still more safe. Add to this, that they could be obtained of a red color, and we are prepared to admit, even without the sanction of a successful experiment, that they were admirably adapted to cross with the short-horn, standing frequently too high from the ground, not very well ribbed home, and not seldom of loose, disjointed frame.

To this breed Mr. Colling resolved to resort; and though at the time when he did so, the event was regarded with some degree of ridicule by the pure blood advocates, and comments passed which would have deterred ordinary men from the exercise of their judgment, Mr. Colling persisted.

He was much favored by circumstances in promoting his object, which was to take one cross, and then breed back to the short-horn,—the only course, by the way, in which crossing can be successfully adopted. To breed from the produce of a cross *directly among themselves* will lead to the results which have induced many persons, without due consideration, to believe conclusive against crossing; but to take one cross, and then return and adhere to one breed, will, in the course of a few generations, be found to stamp a variety with sufficient certainty.

Mr. Colling's short-horned bull *Bolingbroke* was put to a beatiful red-polled Galloway cow, and the produce, being a bull-calf, was, in due time, put to *Johanna*, a pure short-horn,—she also produced a bull-calf. This grandson of Bolingbroke was the sire of the cow, *Lady*, by another pure short-horned dam, and from Lady has sprung the highly valuable family of improved short-horns, termed, in reproach, the *alloy*. How far the alloy was derogatory, let *facts* testify.*

It will probably be admitted that the prejudice against this cross was at the highest at the time of Mr. Charles Colling's sale. The blood had then been little, if at all, introduced to other stocks, and it was manifestly the interest, whatever might be the inclination, of the many breeders who had it not, to assume high ground for the pure blood, and to depreciate the alloy. Under these untoward circumstances for the alloy, what said public opinion, unequivocally certified by the stroke of the auctioneer's hammer? *Lady*, before-mentioned at fourteen years old, sold for two hundred and six guineas. *Countess*, her daughter, nine years old, for four hundred guineas. *Laura*, another daughter four years old, for two hundred and ten guineas. *Major* and *George*, two of her sons, the former three years old, the latter a calf, for two hundred guineas and one hundred and thirty; beside a number of others, more remotely descended from Lady, which all sold at high prices; in fact, in a sale of forty-eight lots, realizing £7115 17*s.* Lady and her decendants sold for a larger sum than any other family obtained.

*The dam of Lady was also the dam of the bull Favorite: and as the grandson of Bolingbroke is not known to have been the sire of any other remarkably good animal, it is most probable that the unquestionable merit of Lady and her descendants is to be attributed more to her dam than to her sire.—*Edit.*

As a specimen of the alloy, the reader is referred to Mr. Berry's cow. She gives a moderate quantity of particularly rich milk.

It would answer no useful purpose, and would certainly be an objectionable course, to bring under particular notice any one or more of the highly valuable stocks of improved short-horns of the present day. To enumerate all would be impossible; and the writer of this account would most studiously avoid any partial or invidious comparison. The same objection does not, however, exist as to a remote period; and it is but justice to state that Mr. Robert Colling, brother of Mr. Charles, (who certainly was the leader, and surpassed all competitors in the improvement of the short-horns,) Mr. Charge, of Newton, near Darlington, and Mr. Mason, of Chilton, in the county of Durham, were only second to Mr. Charles Colling in his interesting and useful pursuit. Mr. Mason started early with animals derived, it is believed, from Mr. Colling, in the very commencement of his career; and Mr. Charge, who had long possessed a most valuable stock of Teeswater cattle, had at an early period crossed them with Mr. Colling's best bulls, and was one of the spirited purchasers of Comet, at a thousand guineas. Mr. Mason's late successful sale sufficiently stamps the value of his stock at that period, but it is generally admitted, the system of crossing with other herds, which he had of late years judiciously adopted, proved highly instrumental in restoring those qualities in his own, which too close breeding had in some degree threatened to deprive them of.

It would be unfair, on this occasion, to omit mention of a veteran breeder, to whom the advocates for the preservation of pedigree are indebted for the *Short-horn Herd Book*—Mr. George Coates. He is now one of the oldest authorities on the subject in existence, and was once the possessor of a very superior race of short-horns, hough somewhat coarse. Portraits have been preserved of some very fine animals bred by him; and he had the solid satisfaction to dispose of his bull *Patriot* for five hundred guineas.

Mr. Coates fell into an error, but too common, and generally equally fatal: he fancied his own stock the best, and disdained to cross them with Mr. Colling's; which, as others afterwards proved, would have been a most judicious proceeding. The consequence was, Mr. Colling's sale having settled the public judgment and taste, Mr. Coates' stock fell into disrepute. If an apology be requisite for this statement of an undeniable fact, it will be found in the utility of holding up such an example as a caution to those who may be in danger of falling into a similar error.

In the commencement of this account, however it was stated that they possess a combination of qualities, hitherto considered incompatible. It will be obvious that the dispositon to feed rapidly, in union with dairy qualifications, is here intended.

It might have the appearance of an intention to depreciate other breeds of cattle, were an inquiry instituted how the very general impression came to be entertained that animals disposed to fatten rapidly seldom give much milk. It is unquestionably true, that every perfection in cattle—whether it be one of form, of quality of flesh, of disposition to fatten, or to yield milk—can be promoted and retained solely by the breeder's devoted attention to his particular object; and if one object be allowed a paramount importance in the breeder's estimation and practice, other objects will suffer in proportion as they are neglected.

The improvement in the carcass of the short-horns has been so surprising, and so justly valued, that many persons have allowed that completely to occupy their attention, and the dairy has been disregarded. In such a state of things, every advance towards one point has been tantamount to receding from another; because the same proceeding which tends to enhance a particular quality, will also enhance a defect, provided such defect, was of previous existence.

This may be rendered more intelligible by a short illustration. Suppose half a dozen animals to be selected in consequence of their possessing a particular quality; which quality it is proposed, on a certain established principle of breeding, to increase and render almost permanent by their union. Suppose the animals so selected to come from the hands of breeders who have neglected the milking property; the certain consequence will be, that the very union which developes and secures the desired object will tend, on the same principle, to increase the defect as to milk. In short, it will render it *habitual* in the produce. But this illustration, by a *selection*, is supposing too much for the probable state of the case. The objections which exist among breeders, for various and some cogent reasons, against crossing with the stocks of each other, unavoidably lead to the practice of breeding in-and-in; which, in case of any original deficiency of the milking property, must unquestionably go on to render that deficiency greater. It is hence evident that bad milking, in a breed of animals which were ever distinguished as good milkers, is not a necessary consequence of improvement in the animal in other respects, but a consequence of the *manner* in which such improvement is pursued. This the writer considers to be the reasoning properly applicable to the subject; which happily also admits of a satisfactory appeal to facts; and he is strictly justified in asserting that improved short-horns, inferior to none for the grazier, may always be selected and bred with the most valuable dairy properties. Perhaps a more plentiful and steady milker than the dam of Mr. Berry's bull, never stood over a pail, and few such carcasses of beef have been exhibited as hers, when an accident rendered it requisite to only half-feed her. The bull himself has an extraordinary disposition to carry flesh, and his calves are let down in the udders like miniature cows. In fact, all the bull's family are excellent for the pail, and the quickest possible feeders. The writer has known many instances of the highest bred short-horns giving upwards of four gallons (wine measure) of milk, night and morning; and it is certain that attention only is requisite, on the part of the breeder, to perpetuate this quality in any desirable extent. While on this subject, it is proper to observe, that the excessive quantities of milk obtained from the unimproved short-horns are seldom or ever obtained from the improved; but a moderately good milker of the latter kind will be found to yield as much *butter* in the week, as one of the former: the milk being unquestionably of very superior quality; and indeed, it was likely such should be the case, and that the artificial change in the animal economy, which leads to

an excessive secretion of flesh and fat, should also be productive of other rich secretions. Within the last three or four years, affidavits were sworn before a magistrate in America, that an improved short-horned cow, imported thither, produced after the rate of 20 lb. of butter per week.

Wherever the improved short-horns have been crossed with other eattle, their superiority is equally manifest, in respect of dairy qualifications, as in every other. On this subject the writer is able to avail himself of the evidence of a gentleman who has addressed a communication on the subject to the conductor of the *British Farmer's Magazine*, which is so pertinent to the present subject that the temptation to take an extract is irresistible. It is as follows: "In the 27th number of your valuable magazine, when giving an account of my two-years'-old steer, you also give an extract from my letter on the advantages of crossing cows of different breeds with improved short-horn bulls; and in confirmation of this opinion, (not hastily adopted, but the result of several years practical experience, and a close attention to the experiments of several friends during the last seventeen years,) I send you the portrait and a short account of a two-year old Durham and Devon heifer of mine, lately slaughtered by Mr. William Daniel, of Abergavenny, and accompany it with a few brief statements of the advantages derived from this system by several of my own personal friends.

"This heifer was the second cross, and was of a light gray color. She weighed 35 scores and 8 lb.; rough fat, 98 lb.; she was allowed to be the fattest and best beast of her age, in all points, ever seen in Abergavenny. She had a dead calf about six weeks before Christmas; was dried the 17th of January, and killed the 10th of June. She sold for £19 3*s.* 6*d.*

"Her live weight, on the 8th of June, was - - -	1232 lbs.
Ditto, on the 17th January -	840
Increase in 140 days - -	392

"Being aware that strong prejudice and much incredulity existed on the subject of crossing, I courted the attention of all the respectable farmers, breeders, and feeders in this neighborhood. Many came to see her when first put up, and repeatedly afterwards during the five months she was feeding; and they all concurred in saying she went on faster than any beast they had ever seen. She never had any oil-cake.

"I have seen many excellent beasts bred from *improved* short-horn bulls and long-horn cows: indeed I never knew one of these bulls put to any cow, where the produce was not superior to the dam; but the cross which I advocate, and with which I am best acquainted, is that with the Devon cow. I have uniformly remarked, that each succeeding cross was attended with a proportionate improvement in size, quality of flesh, and aptitude to fatten. In every instance they have shown themselves superior milkers, and stand to the pail till within six or eight weeks of calving; and several instances have come under my own knowledge where they have never been dry since they first calved; and so highly are they prized as milkers, that a friend of mine, who hired out dairies, informed me that the dairymen gave him nearly 2*l.* per cow per year more for the half and three-quarter breds, than they would give for cows of other breeds.

"A friend of mine had about a dozen North Devon cows, small in size, but nice in quality, and from these he commenced, about twenty years since, breeding with short-horn bulls. He has since invariably used those bulls. With each succeeding cross the stock have rapidly improved in every essential, and the only trace of the Devons which I could preceive when I last saw them, about two years since, was a peculiar richness in their color. He breeds about thirty annually, and generally sells his three-years-old, in the autumn, at £17 to £22; and I have known him to sell in-calf heifers to jobbers in fairs as high as 30 guineas each. All his stock are superior milkers. Here we have twenty years' experiment and continued improvement.

"Within the last eight years I have sent many North Devon heifers to Ireland, to friends residing in different counties, and some of them occupying land of very inferior quality. I also sent over two young Durham bulls, from the stock of the Rev. Henry Berry, to cross them with. They have all crossed them with short-horn bulls at my recommendation, and the accounts they give are most satisfactory. They say the two-years old half-breds are as good as the three-years old Devons, and are all good milkers. One of these bulls, by Mr. Berry's *Mynheer*, has been four times exhibited in three different counties, and has each time taken the first prize. He was last year sold for 60 guineas, and is now serving cows at £1 each.

C. H. Bolton.

"*Brynderry, near Abergavenny.*"

An opinion generally prevails that the short-horns are unfitted for work; and in some respects it is admitted they are so; but the correct reason has not been assigned, and the question may fairly come briefly under notice. That they are willing and able to work, the writer knows, from one in particular among many instances. He has now a team of two-years old steers, working constantly nine hours a day; a system he would by no means recommend, and forced on him by circumstances connected with entrance on a new farm, at present ill adapted to grazing cattle. They work admirably; but surely cattle which, as the preceding account proves, will go as profitably to the butcher at two years old as any other breed at three, and as many even at four, ought never, as a general rule, to be placed in the yoke. No beast in the present advanced state of breeding, ought to be put upon a system which arose out of the necessity of obtaining compensation by work for the loss attending a tardy maturity. But where it may be convenient, the short-horns, particularly the bulls, work admirably, as their great docility promises; and there are many operations going on in every farm which a bull would be judiciously employed in performing. And as the bulls of this breed are apt to become useless, from acquiring too much flesh in a state of confinement, moderate work might, in most case, prove beneficial for such as are intended for use at home.

With deference, however, it is submitted to the breeders of short-horns that they should avoid breeding from too close affinities, and while they steer clear of coarseness, should require a sufficiency of *masculine* character in their males.

Lord Althorp first adopted the short-horns in 1818, when he purchased the bull *Regent* at Mr. R. Colling's sale, with several of that gentleman's cows; and since that time his lordship has been unremitting in his attempts to improve the breed. The bull *Firby* is good in almost every point. His flanks, loins, hips, and bosom are excellent. His only failing is in the crop; yet we are told by his lordship's very intelligent steward, (Mr. Hall,) and we had proof of the accuracy of the observation, when we had the pleasure of looking over the Wiseton herd, that after using him six years, very few of his stock have inherited this imperfection. Lord Althorp's bull *Firby* evinces this requisite in a proper degree. He has also—but, indeed, it is only part of the other, for without it good masculine character cannot exist—an excellent loin. This is a point in which many short-horns are rather defective, and it is one of infinite importance. Add to this, that if, in many instances, the length of the carcass were abated, as well as that of the legs, a hardier animal, with equal size and on a more profitable scale, would be produced. The facilities for making this improvement are sufficiently numerous, the short-horns being now more generally diffused. That wider diffusion also multiplies the means of selecting for milk; a quality which should not be lost sight of: for it is the *combination* of perfections which has conferred, and will perpetuate, the superiority of this breed of cattle.

The colors of the improved short-horns are red or white, or a mixture of the two, combining in endless variety, and producing, very frequently, most brilliant effect. The white, it is very probable, they obtained from an early cross with the wild breed; and whenever this color shows itself, it is accompanied, more or less, with a red tinge on the extremity of the ear: a distinctive character, also, of the wild cattle. No *pure improved short-horns* are found of any colors but those above named. There is a large coarse short-horn, prevailing particularly in Lincolnshire, denominated in the quotations of the Smithfield markets "Lincolns," and generally sold at prices below those of any other cattle. These are frequently black, black and white, blue and dun; but they have no further affinity with the improved short-horns than as the latter have been referred to for their improvement, which has been accomplished to a considerable degree. A similar description of large, coarse short-horns, of these objectionable colors—for they generally accompany a bad quality of flesh—prevails in some of the midland counties. They are great consumers of food, gutty, and particularly low and bad in the loins, with excessively heavy shoulder-blades. The owners of this stock, however, are crossing with the improved breed; but the dairy-farmers of Gloucestershire are so much alive to the superiority of the short-horns, that they lay hold with avidity of any thing which approaches them in color, or is called by the name. Indeed, should this breed continue to obtain the requisite attention, to maintain in its present excellence, it is not too much to suppose that it will, before long, alter the character of the cattle in most of the great breeding districts. It would have been thought incredible some years ago, but is nevertheless the fact, that they are treading closely on the strongholds even of the Herefords; and an observing traveller, who sees their colors staring to view in very unwonted situations, must pronounce them universal intruders.

Thus far Mr. Berry, whose admirable account of the improved short-horn cattle, our readers will duly estimate. There is no point which he has more triumphantly illustrated than the value of of this breed, as containing a combination of perfections. It was a point which was in a manner lost sight of by the early improvers. They developed the aptitude to fatten, and the early maturity of the short-horns, but they neglected, and were beginning to lose, their milking properties. This is also the grand error of many modern breeders; and hence arose the general impression, and founded on careful observation, that in proportion as the grazing properties of the beast were increased, its value for the dairy was proportionably diminished.

The Yorkshire cow, which now almost exclusively occupies the London dairies, is an unanswerable proof of the possibility of uniting the two qualities to a degree of perfection, *but not at the same time*:—they succeed to each other, and at the periods when it suits the convenience of the dairyman that they should. Twenty years ago the Yorkshire cow was, compared with other breeds, as great a favorite in the London market as at present. She yielded more milk, in proportion to the quantity of food consumed, than could be obtained from any other breed; but when the dairymen had had her four years, she began to fall off, and he dried her, and sold her. It took a long time to get much flesh upon her bones; and when he calculated the expense of bringing her into condition, he found that his cheapest way was to sell her for what she would fetch, and that seldom exceeded *5l.*

By degrees, however, some of the more intelligent breeders for this market began to find that, by cautiously adopted Mr. Berry's principle of selection—by finding out an improved short-horn bull, whose progeny were generally milkers, and crossing some of the old Yorkshires with him, and then going back to the pure blood—but still regarding the milking properties of the dam—and the usual tendency to possess these qualities in the offspring of the sire—they could at length obtain a breed that had lost little of the grazing properties of the new breed, and retained, almost undiminished, the excellence of the old breed for the pail. Thence it has happened that many of the cows in the London dairies are as fine specimens of the improved short-horn as can possibly be produced. They do not, perhaps, yield *quite* so much milk as the old ones, but what they do yield is of better quality; and whether the dairyman keeps them a twelve-month, or a little longer—and this is getting more and more the habit of these people—or whether he milks them for three or four years, as soon as he dries them, they fatten as rapidly as the most celebrated of the improved breed. Mr. Parkinson gives an account of one which, after being milked on the 5th of April, was sent to grass with others, and sold on the 5th of July, after ninety-one days grazing, having made in that time nearly two shillings a day.

The Yorkshire cow is a fair specimen of one of these cows—the character of the Holderness and the Durham beautifully mingling. A milch cow, good for the pail as long as she is wanted, and then quickly got into marketable condition, should

have a long and rather small head; a large-headed cow willl seldom fatten or yield much milk. The eye should be bright, yet with a peculiar placidness and quietness of expression; the chaps thin, and the horns, small. The neck should not be so thin as that which common opinion has given to the milch cow. It may be thin towards the head; but it must soon begin to thicken, and especially when it approaches the shoulder. The dewlaps should be small; the breast, if not so wide as in some that have an unusual disposition to fatten, yet very far from being narrow, and it should project before the legs; the chine, to a certain degree fleshy, and even inclining to fulness; the girth behind the shoulder should be deeper than it is usually found in the short-horn; the ribs should spread out wide, so as to give as globular a form as possible to the carcass, and each should project farther than the preceding one to the very loins, giving, if after all the milch cow must be a little wider below than above, yet as much breadth as can possibly be afforded to the more valuable parts. She should be well formed across the hips and on the rump, and with greater length there than the milker generally possesses; or if a little too short, not heavy. If she stands a little long on the legs, it must not be too long. The thighs somewhat thin, with a slight tendency to crookedness, or being sickle-hammed behind: the tail thick at the upper part, but tapering below; and she should have a mellow hide, and little coarse hair. Common consent has given to her large milk-veins; and although the sub-cutaneous or milk-vein has nothing to do with the udder, but conveys the blood from the fore part of the chest and sides to the inguinal vein, yet a large milk-vein certainly indicates a strongly developed vascular system—one favorable to secretion generally, and to that of milk among the rest.

The last essential in a milch cow that we shall mention is the udder, rather inclining to be large in proportion to the size of the animal, but not too large. It must be sufficiently capacious to contain the proper quantity of mllk, but not too bulky, lest it should thicken and become loaded with fat. The skin of the udder should be thin, and free from lumps in every part of it. The teats should be of moderate size; at equal distance from each other every way; and of equal size from the udder to nearly the end, where they should run to a kind of point. When they are too large near the udder, they permit the milk to flow down too freely from the bag, and lodge in them; and when they are too broad at the extremity, the orifice is often so large that the cow cannot retain her milk after the bag begins to be full and heavy. The udder should be of nearly equal size before and behind, or, if there is any difference, it should be broader and fuller before than behind.

The quantity of milk given by some of these cows is very great. It is by no means uncommon for them, in the beginning of the summer, to yield 30 quarts a day; there are rare instances of their having given 36 quarts; but the average measure may be estimated at 22 or 24 quarts. It is said that this milk does not yield a proportionate quantity of butter; and that although these cows may be valuable where the sale of milk is the prime object, they will not answer for the dairy.

That their milk does not contain the same proportionate quantity of butter as that from the long-horns, the Scotch cattle, or the Devons, is probably true; but we have reason to believe that the difference has been much exaggerated, and is more than compensated by the additional quantity of milk. At the first introduction of the improved breed, the prejudice against them on this account was very great, and certain experiment were made, by the result of which it was made to appear that the milk of the Kyloe cow yielded double the quantity of butter that could be produced from that of the improved short-horn. Two ounces were obtained from the milk of the Kyloe, and one from that of the short-horn.

This aroused the advocates of the new breed, and they instituted their experiments, the result of which was much less to the disadvantage of the short-horns. Mr. Bailly gives an account of an experiment made by Mr. Walton, of Middleton. He took from his dairy six cows promiscuously, and obtained the following quantity of butter from a quart of the milk of each of them.

	oz.	*dwts.*
No. 1 - - -	3	6
2 - - -	1	6
3 - - -	1	12
4 - - -	1	10
5 - - -	1	14
6 - - -	1	6
	10	8

, which divided by 6, leaves nearly 1 oz. 14¾ dwts., or about seven-eighths of the weight of butter from the same quantity of milk. Then, the increased quantity of milk yielded by the short-horn gave her decidedly the preference, so far as the simple produce was concerned.

This experiment brought to light another good quality in the improved short-horn, which, if not altogether unsuspected, was not sufficiently acted upon—that she improved as a dairy cow as she got older. The cow, a quart of whose milk produced more than 3 oz. of butter, was six years old; the other five were only two years old; at all events, the experiment proved that her milk was richer at six years old, than it had been at two. This is a subject which deserves investigation.

Another circumstance is somewhat connected with such an inquiry. The Kyloe and the long-horn cattle seem to care little about change of situation and pasture; but the short-horn is not so easily reconciled to a change; and her milk is not at first either so abundant or so good as it afterwards becomes.

A prejudice likewise existed, and perhaps does yet in the minds of some dairymen, against the large improved short-horns. The breed generally are great consumers; and it was also supposed that, in proportion to the condition of the cow, she was likely to run to flesh instead of yielding milk, and therefore a rather small cow was selected, and one that did not carry about her many proofs of point.

That there is a great difference in the quantity of food consumed by different breeds of cattle, cannot be doubted; and that the short-horns occupy the highest rank among the consumers of food is evident enough; but we never could be persuaded that the difference of size in the same breed made any material difference in the appetite, or the food consumed. When they stand side by side in the

stall or the cow-house, and experience has taught us the proper average quantity of food, the little one eats her share, and the larger one seldom eats more, even when it is put before her. There are occasional differences in the consumption of food by different animals, but these arise far oftener from constitution, or from some unknown cause, than from difference of size. Experience does, however, prove beyond the possibility of doubt that the larger cattle, the breed and other circumstances being the same, yield the greatest quantity of milk.

Experience has also proved another thing—that the good grazing points of a cow, and even her being in fair store condition, do not necessarily interfere with her milking qualities. They prove that she has the disposition to fatten about her, but which will not be called into injurious exercise until, in the natural process of time, or designedly by us, she is dried. She will yield nearly as much milk as her unthrifty neighbor, and milk of a superior quality, and at four, five, or six years old, might be pitted against any Kyloe, while we have the pledge that it will cost us little to prepare her for the butcher, when we have done with her as a milker. It is on this principle that many of the London dairymen now act, when they change their cows so frequently as they do; but whether this, even allowing the rapidity with which the beasts fatten, is the best and most profitable mode of management, will be the subject of future inquiry.

Some time after Mr. Walton's experiment, the following observations were made by Mr. Calvert, of Sandysike, near Brampton, on the quantity of butter yielded by one of his improved short-horns. The milk was kept and churned separately from that of the other stock, and the following is the account of the number of pounds of butter obtained in each week: 7, 10, 10, 12, 17, 13, 13, 13, 15, 16, 15, 12, 13, 13, 13, 14, 14, 13, 12, 12, 13, 11, 12, 10, 10, 8, 10, 9, 10, 7, 7, 7.

From this it appears that there were churned 373 pounds of butter in the space of 32 weeks. The cow gave 28 quarts of milk per day, about Midsummer, and would average nearly 20 quarts per day for 20 weeks. She gave more milk when she was depastured in the summer than when she was soiled in the house, in consequence of the very hot weather. She was lame during six weeks, from "foul in the feet," which lessened the quantity of milk during that time; and the experiment was discontinued, because there was not a sufficient supply of turnips, and the milk of the whole of the herd was rapidly diminishing. For the first fortnight after calving, she was allowed a little broken corn; and from that period to the commencement of the turnip-season, she lived entirely on grass, with some cut clover, when it was necessary to shelter her from the inclement heat. The pasture was by no means of a superior quality.

After such a record--and it is far from being a singular one,—"there can be no doubt," to adopt the language of the reporter, "of the possibility of raising a breed of milking short-horns, which will surpass every variety of cattle in the kingdom." We may, perhaps, safely add, that we have that breed, and that it only requires a little care in the selection, and in crossing, to perpetuate it.

MEASUREMENT OF CORN-CRIBS AND GRANARIES. CLIMATE OF ITALY, AND OF THE VALLEY AND PIEDMONT OF VIRGINIA.

To the Editor of the Farmers' Register.

Rockbridge Co., June 9th, 1839.

In an early number of the Farmers' Register, you published a communication from one of your correspondents, containing an easy and convenient method of calculating the contents of a corn-crib, &c., in barrels. The method there given, will, no doubt be found very useful to all those who are accustomed to count their corn, by the barrel; but we, who live west of the Blue Ridge, are accustomed to estimate our corn, as well as our wheat, by the bushel. A rule, then, of convenient and ready application, for calculating the number of bushels contained in a corn-crib will suit us better than the one you have given. I have been in possession of such a rule more than thirty years. It is, however, not one of my own invention. I found it in some work on agriculture, I think, 'Bordley's Husbandry.' It is very similar to the rule I have alluded to for calculating by the barrel. They are both founded on exactly the same principles, I think.

The rule for finding the content of a crib, granary, &c. in bushels, is the following.

Find the content of the crib or granary in cubic feet; then multiply the cubic feet by 8, and from the product cut off one figure to the right hand; the remainder is the content in bushels.

Example. Suppose a corn-crib to be 20 feet long, 8 feet wide, and 9 feet high; by multiplying these numbers together we shall have the contents in cubic feet, viz. 1440; this number multiplied by 8 will give 11520. Cut off the nought on the right hand, and the content in bushels will be 1152. If the crib be filled with corn in the ear, take one-half of the content in bushels, and the content in shelled corn will be 576.

This rule is not precisely accurate. It is founded on the supposition that a bushel contains a cubic foot and a quarter; but our statutary bushel is somewhat less than a cubic foot and a quarter. When Mr. Jefferson was secretary of state of the United States, he made an elaborate report on weights and measures, in which he recommended to congress that a cubic foot and a quarter should be adopted as the content of the bushel for the United States. No law was ever passed by congress on the subject, but if Mr. Jefferson's recommendation had been adopted, the rule I have mentioned would be precisely accurate. It approaches accuracy, however, so nearly as to answer all common purposes. The cubic foot and a quarter contains 2160 cubic inches; the statutary bushel $2150\frac{4}{10}$ cubic inches, which is $9\frac{6}{10}$ cubic inches less than Jefferson's bushel; but $9\frac{6}{10}$ cubic inches is but little more than a gill, and would make a difference of about a bushel in two hundred.

While I am on the subject of measures, I would remark that, until lately, I had never seen an arithmetic in common use, which contained a complete table of dry measure. They tell us how many gallons make a peck, and how many pecks make a bushel; but they do not tell us how many cubic inches are in a gallon. If we take the cubic inches in a wine gallon as our standard, our bushel will be too small; if we take those in a

beer gallon, our bushel will be too large. Mr. Davies, the professor of mathematics at West Point, published an arithmetic a few years ago, intended for common schools, which contains a very complete table; but the work I believe has not yet come into common use, although it is certainly superior to those generally used.

The extract from Arthur Young's 'Notes on the Agriculture of Lombardy,' published in the number of the Register for last April, page 196 under the word "Omission," surprised me exceedingly. I have long been in the habit of considering the climate of Italy, especially of the northern and middle parts, as amongst the most pleasant in the world; but Mr. Young informs us that "the great complaint in Piedmont is the excessive heat in summer; equal, he was assured, to almost any that is felt on the globe, and of a suffocating quality; while the frosts in winter are as severe, in the contrary extreme." While I considered the climate of Italy, in general, so pleasant, I thought that of Florence peculiarly so. With the idea of Florence, I always associate the ideas of clear sunshine, of flowers, and of Milton's Valombrosa; but it seems it was all an illusion; for Mr. Young says—"I was at Florence in the beginning of November, and the ice was four inches thick." He tells us also that "one-fifth of all the productions of the earth are calculated to be destroyed by hail and other accidents." And again he says, "in the management of the vines in the Parmasan, there is a practice which shows the constant dread of severe frosts. All the vines are now (in November) turned down, and the end shoots buried in the earth to preserve them"—although this operation injures them. Ice four inches thick on the first of November, and vines buried to protect them from the winter frosts, indicate a severity of winter cold, very near to that of Montreal and Quebec in Canada.

I have long considered our great limestone valley, and the range of counties in Virginia immediately east of the Blue Ridge, as naturally the most desirable country in the United States. My principle objection to it was, that it was too cold in winter, and too warm in summer. But as in these respects it seems to be greatly superior to the far famed Italy, the objection must be given up.

While I think so highly of the "valley" and the Piedment country east of the Blue Ridge, I would not disparage the tide-water region of Virginia. When you drain your marshes and mill-ponds, and your fields, and prosecute an economical and careful system of cultivation, your country will become as productive and as beautiful as the Netherlands of Europe. But I, who from my infancy, have been accustomed to hills and mountains, could not live comfortably in a plain country, out of sight of clear purling streams, verdant fields, and picturesque scenery.

One other thing in your quotations respecting northern Italy, has surprised me. From Arthur Young's description of northern Italy, it would seem to be one of the most fertile and best cultivated countries in the world; but from Professor Symonds, account published in your last May number, it seems that it is torn to fragments by mountain torrents. The devastation he describes is terrible. I have no data by which to ascertain accurately the year when Arthur Young made his tour in Italy; but I cannot be far wrong in supposing it to have been about 45 years ago. Neither do I know when Professor Symonds made his tour; but say 5 years ago, it would then seem that great change in the country (if indeed, there has been a change,) must have taken place in the short space of about 40 years. This does not argue much in favor of modern improvement, at least in that country.

From the garrulous strain of part of this communication, you will readily believe that the writer chose a proper signature, when he adopted that of SENEX.

P. S. Our wheat, rye and oats, in that part of the valley in which I live, promise a most abundant crop. In some parts of the valley I have understood they are not so good. Much rain, however, would spoil our fair prospects. The timothy in our meadows, this season, has almost all turned to cheat; but as you will, probably, not like this phraseology, it being contrary to your theory, I will say that our meadows, which formerly produced timothy, this season produce cheat. This will be a serious draw-back on our farmers, as cheat is a very worthless crop. Clover is very scarce, so that our horses must depend, the ensuing year, chiefly on grain feeding. S.

[The article by Professor Symonds is much older than our correspondent supposed. It was first published in 1784. Young's tour in Lombardy was made in 1789.—ED. FAR. REG.]

COUNTER ESTIMATES, AND OBJECTIONS TO THE ALLEGED PROFITS OF MULBERRY CULTURE. NEW OBSTACLES TO THE TROPICAL PLANT, SCHEME AND OPERATIONS.

Translations of extracts from two letters written in Spanish by myself to Sr. Don M. Margalli, ex-governor of Tobasco, and dated at the Consulate A. Campeachy, 3rd and 5th March, 1836.

"I conclude this sketch of the morus multicaulis by adding some data derived from many experiments. 1. The quantity of leaves which may be produced by one mecate* of mulberry trees can be estimated at an average weight of ten quintals.† Some cultivators say 8, others 9, others 13 quintals; and some even estimate the produce as high as from 13½ to 27 quintals the mecate: but it should be observed that they speak of periods differing from the 5th to the 20th year of the plantation. I have extracted these proportions from the measures of French hectares and English acres; and hence I have arrived at the resulting inference, that without exaggeration one may extract from trees in the third year at the rate of 10 quintals of leaves from each mecate in each crop, *i. e.* 20 quintals of leaves from one mecate in one year. 2. The quantity of cocoons that may be obtained from one quintal of leaves, I place at the medium of six pounds and a half of cocoons. Some persons have obtained 5 to 5¼ and 5¾ pounds, and others 7¼ to 7½ lbs. cocoons to each quintal of

* One mecate equal one-tenth ot an acre.
† One quintal equal 100 pounds.

leaves; but as the smaller quantities were obtained from the leaves of the white mulberry, I believe the proportion of 6½ pounds of cocoons to one quintal of leaves to be very moderate. 3. The quantity of leaves consumed by one ounce of eggs may average twenty quintals. The cultivators vary much in their estimates of the quantity of leaves consumed by the worms which are born from one ounce of eggs, the number of which exceeds 50,000 worms; but we should consider that the most experiments were made with the leaves of the white mulberry. The following numbers indicate the different results: 10½ qqls., 11 qqls. 88 lbs; 13 qqls. 20 lbs., 16 qqls., 19 qqls., 20 qqls., and even 25 quintals of leaves, for one ounce of eggs. In view of these experiments I believe myself sufficiently liberal in conceding 20 qqls. of leaves for one ounce of eggs. 4. The quantity of cocoons produced by one ounce of eggs must consequently vary in proportion to the quantity of leaves consumed, and according to my estimate of 6½ lb. for 1 qql.×20=130 pounds of cocoons from 1 oz. of eggs. The results of experiments have varied from 50 to 60, 70, 92⅔, 97⅔, 116, 121, 123½, 140, and even 165 pounds cocoons to 1 oz. eggs. 5. The medium quantity of net silk from 1 lb. of cocoons may be estimated at one-tenth, or 1 lb. silk to 10 lb. cocoons.

Recapitulation.

1st fact. 1 mecate of mulberries yields 10 qqls. leaves each crop, or 20 quintals on the two crops for one year.

2nd. 1 quintal of leaves gives 6½ pounds of cocoons, which equals 130 lb. for two crops from one mecate one year.

3. 1 ounce of eggs consumes 20 qqls. of leaves, or produce of one mecate for one year, equal half ounce eggs for one crop of 10 quintals.

4. 1 ounce of eggs will yield 130 pounds of cocoons from one mecate, as noted in fact 2nd.

5. 1 pound of cocoons yields one-tenth silk; *i. e.* 13 lb. silk from one mecate in two crops in one year.

And hence 5 mecates=100 quintals leaves=650 lb. cocoons=65 lb. net silk, at $5=325 dollars, one year. Giving to the cultivator 75 dollars for the leaves, calculated at 4 francs the quintal; to the raiser 107 dollars 6½ shillings net for the cocoons, or $182 6½ gross, at 1½ francs the pound; to the reeler 142 dollars 1½ shillings net for the silks, or $325.

Hence—one mecate yields to the cultivator in leaves, in two crops, valued at 75 cts. the 100 lb. - - - - -	$15 00
To the rearer of 130 lb. cocoons from those 2000 lb. leaves, gross $36 56¼ cents, at 28⅛ cts., or net - - -	21 56¼
To the reeler of 13 lb. of silk from those 130 lb. cocoons, gross 65 dollars, at $5 or net - - - - - -	28 43¾

But admitting that from each quintal of leaves there should be obtained solely the minimum of 5 pounds of cocoons, and that both the leaves and the cocoons should be sold in Yucatan at 33⅓ per cent. less than their price in France, or what is the same that the French should sell their leaves and cocoons at 50 per cent. more than the people of Yucatan; nevertheless, the business will still be more profitable than any other cultivation in this peninsula. At 50 cts. the 100 lb. leaves, and at 18¾ cts. for 1 lb. cocoons, one mecate yields 10 dollars a year to the cultivator of the *leaves*; and $24 37½ gross, or $14 37½ net to the rearer of the cocoons; and at $3 33⅓ cts. for 1 lb. silk, it yields $43 33⅓ gross, or $18 96 net to the reeler. That is, $10 leaves+14 37½ net cocoons+18 96 net silk=$43 33⅓ cents.

HENRY PERRINE."

Note by H. P. at Indian Key, 25th April, 1839.

The last estimates proportioned to an English acre will be ten times the number and value. That is, one acre should yield in *two* crops 20,000 pounds of *leaves*, at half a cent a pound=$100; of *cocoons* 1300 pounds at 18¾ cents a pound=$213 75 cts. gross, or $143 75 cts. net; of *silk* 130 pounds, at $3 33½=$433 33⅓ cts. gross, or $189 60 cts. net.

For *one* crop, *leaves* from one acre, *gross* $50; cocoons $121 87½; silk $216 66.

To the Editor of the Farmers' Register.

Indian Key, Tropical, Florida,
25th April, 1839.

Sir—Having attentively examined the estimate of the value of the mulberry and silk-culture, by Dr. Wm. Gibbons, of Delaware, published in your February No., on the 85-6 pages; and, "as doctors will disagree," believing that all similar "estimates," however well calculated to promote the sale of mulberry cuttings, will prove injurious to the culture of silk-worms, I send you a counter estimate, based on the quantity of leaves that may *commonly* be raised by ordinary cultivation on ordinary soils. So far as I can understand your opinions, I believe they agree perfectly with mine in the following positions. 1st, That the national importance of the combined propagation of the mulberry and production of silk is not to be estimated by the hypothesis that this branch of industry will yield *more profit* than an equal amount of labor and capital employed in the culture of corn or of cotton. 2nd, That the great national advantages of this new branch of industry will result from the facts that it will as *profitably* employ those poor soils and feeble persons that cannot be profitably dedicated to the culture of corn or cotton, or any of our old staples of agriculture. 3. That as a small surface of the poorest soils cultivated by the poorest man will yield leaves enough for the feeblest persons in health, sex or age, of the largest family to feed unto worms and to reel into silk, the great national result will be to cover our hitherto worthless soils with a dense population of small cultivators, and of family manufacturers.

In relation to the profit of raising mulberry leaves alone, I long since, even in the tropical climate of Yucatan, made the following *estimate*, viz: that the intrinsic value of mulberry leaves for *food for silk-worms* is about equal to their intrinsic value for fodder for milk cows!! As a collateral conclusion, I add that the desideratum is not merely to get the species of mulberry which will yield the greatest weight of leaves to the surface of a single acre of the poorest lands, but also that which will yield the greatest weight of leaves to the labor of a single hour, or single hand. Indeed, for the steril islands of Tropical Florida, I appreciate the value of the morus multicaulis more highly as fodder for cows, to convert into milk, than as food for worms to con-

vert into silk; yet for either purpose I should not estimate the value of its cuttings at half a cent, or one-eighth of the estimate of Dr. Gibbons, although here the trees will yield at least *two crops* a year.

Counter estimate of the value of the morus multicaulis for silk-culture.

1. One acre of the poorest soil, with common culture, may commonly yield 5000 lb. leaves per acre.

2. Two hundred pounds of leaves with common management may commonly yield 1 lb. silk.

3. Hence one acre of the poorest soils, with common labor and common success, may yield 25 lb. silk.

4. Twenty-five pounds of silk might commonly be reeled from 250 lb. cocoons, of 400 to each pound.

5. The relative value of leaves is estimated at one-fourth the quantity of cocoons.

6. The relative value of picking and transporting the leaves at one-fourth ditto.

Hence—

1st. One pound of ordinary raw silk, as commonly reeled, may bear the average price of $3.

2. The ten pounds of cocoons from which the silk would be reeled, at 20 cts. per lb., equal $2.

3. The two hundred pounds of leaves eaten to make those cocoons, at one-fourth [the value of the cocoons,] or $\frac{1}{4}$ cent per lb.=50 cents.

4. The picking and transportation of said 200 lb. leaves to the cocoonery, at one-fourth=50 cts.

Thus for one cent—

1. The cultivator must raise 4 lb. of leaves; and the picker must transport them for one cent.

2. The feeder must rear 40 worms into cocoons; and the reeler must unwind them for one cent. Now if the farmer can get but 25 cts. the 100 lb. for leaves on the trees, or 50 cts. when carried to market, he will obtain for 5000 lb. but 12½ dollars per *acre* in the field, or $25 at the cocoonery. And what farmer would consent for this result to give even half a cent each for 1200 cuttings, or $60 the acre?

Charles Howe, esq. of this islet, who has been propagating the morus multicaulis on this barren rock during upwards of two years past, has been forced, by the removal of his fence, to avail himself of an accidental rain at the season, in setting out the cuttings of the trees which would otherwise have been left outside of his enclosure, is now multiplying them for the express purpose of affording fodder for his cows during the dry season, when the common grass herbage is withered or dead. He obtained them at first under the common delusive impressions of the great profits to be derived from the silk culture; and indeed if there be any profits at all, north of Florida, he was certainly warranted in the inference that he could make at the least double profits, by the fact that in Tropical Florida the trees will yield, at the very least, double the weight of foliage every year. And hence, at all events, whether as fodder for cows or feed for worms, if the leaves can be raised in the middle states at any profit, they can be raised here at one hundred per cent. more. As during the last eight years, I have almost constantly used a *manifold writer*, I am enabled to transmit you the copy of some estimates made by me at Campeachy, in March, 1836, in order to stimulate the indolent Mexicans to engage in the combined propagation of the mulberry and the culture of silk. You will perceive by the data contained in that article that I was misled into the error of admitting ten thousand pounds of leaves to one crop from one acre, which is just 100 per cent. more than I am now willing to admit will be commonly obtained, by common culture, from one acre of the poorest soils. Judging, however, by the variant estimates of those writers who wish to encourage the sales of mulberry trees at high prices, one hundred per cent. is a very trivial mistake! In the table of probable produce per acre, given by E. Roberts, from 16 different persons, we find the number of pounds of silk varying from 18 to 27, and 61 lbs. in the lowest, to 333, to 666, and even 1296 lbs. in the highest; and hence the estimate of the leaves per acre multiplied by 200 lb. leaves for 1 lb. silk, must vary from 3600 lbs. to 259,200 lbs. of leaves to the acre!! or 7200 per cent!!! Mr. Roberts very gravely remarks that some of these are quite too high!! and then very gravely sums up the total, divides by 16, and assumes that 249 $\frac{5}{16}$ lbs. at $4 per lb. or $1000 per acre, may safely be put down as the average profits!!! This mode of ascertaining profits reminds me of the mode of ascertaining damages practised by a frontier jury in Illinois, when I resided there many years ago. Each juror chalked down his individual estimate of the damages in a suit for assault, the lowest being one cent and the highest 500 dollars, the aggregate of 600 was divided by 12, and the verdict brought in for 50 dollars! But seriously, these extravagantly discordant estimates will injure the progress of legitimate silk-culture in the United States. I have seen the weight of leaves requisite for one ounce of eggs vary from 1050 to 2500 lbs. in estimates; the weight of cocoons from one ounce of eggs vary from 50 to 165 lbs.; the weight of cocoons from 100 lbs. leaves from 3$\frac{3}{5}$ lbs. to 7$\frac{3}{4}$ lbs.; the weight of cocoons for 1 lb. silk, from 8 to 13 lbs.; the number of cocoons for 1 lb. silk from 2000 to 6000!! What the public wants are positive facts from the *bona fide* silk-culturists themselves. When a series of poor men on the poorest soils shall credibly testify that their ordinary crops of leaves, with ordinary culture, have exceeded 5000 lbs. leaves per acre, I shall believe the facts, but not till then. With these moderate opinions of the value of the silk culture, I nevertheless estimate its national importance on a much higher scale than those who attempt to seduce the public by the specious prospect of speedier and greater profits than are obtained from our old staples of agriculture.

I was the first person that introduced the morus multicaulis, not only in Tropical Florida, but into any part of East Florida. By the 'Silk Culturist' of July, 1836, p. 123, I perceive that under the date of St. Augustine, June, 1836, a Mr. D. Brown, claims that honor by saying, "In November, of '33 I arrived in St. Augustine with fifty small plants of the morus multicaulis, obtained from Mrs. Parmentier. They were the first ever brought to Florida."

Now the facts are, that the same worthy lady, under date of the 5th April, 1833, shipped for me twelve trees of morus multicaulis in the schr. Olynthus, Capt. Trowbridge, care of T. A. Browne, Key West, by whom they were forwarded (or rather backwarded) north-eastwardly

say 150 miles to John Dubose, inspector at Cape Florida, where they arrived on the 20th May, 1833.

I take this occasion to acknowledge publicly that the patriotic Madame Parmentier not only sent for me at the same time to Cape Florida a fine assortment of valuable plants, but that she refused to accept any pecuniary compensation for even the morus multicaulis. To this highly enlightened woman, and to her exceedingly intelligent daughter, was Professor Ramen de la Sagra, of the botanical garden at Havana, indebted for the first tree of morus multicaulis and for the first eggs, in the fall of 1832, with which he made the first essays on the propagation of the plant and the culture of silk in the island of Cuba, which resulted in the conviction that there, as in Guadaloupe, *ten* crops of cocoons can be raised every year; and if so in tropical Cuba, ten crops *can* be annually raised in tropical Florida. By the by, my family are now engaged in experimenting with four or five varieties of silk-worms, some of which are now spinning their cocoons; and as they keep an accurate record, the copy shall be at your service.

If John Dubose had possessed the knowledge and disposition requisite to propagate those twelve trees of morus multicaulis, received by him on the 20th May, 1833, their progeny on this 25th April, 1839, might have been multiplied into many millions of trees. But I have the great regret to say that whatever may have been their artificial or spontaneous propagation in the vicinity of Cape Florida, their number has been *diminishing*, by dishonorable means, since their speculative value has become known; as it seems that even an officer of the United States thinks that he has as good a right to them as the Indians.

To show how the power of our departments to do great good may be perverted to do great evil, by their distant and inferior agents, I will give a single example. In July of last year, Col. Downing, the delegate from Florida, requested Mr. Poinsett to give me a special letter of instructions to the commander of the schooner Wave to render me any aid which would not interfere with his particular duties to the department. The Hon. Secretary of War, moreover, spontaneously proffered me a *general circular* to the same effect, directed to all the officers and agents of the war department in and near the territory of Florida.

As during the Indian warfare on the main land the trustees of the Tropical Plant Company could not do any thing more useful than to establish on the most eligible Key a preparatory nursery for all valuable plants which can be profitably propagated in the most arid soils, and hence especially important for all these steril islands, we selected and improved on lower Matacumba, the site immediately adjoining the watering pits for all the vessels along this reef; and hence *the only aid under the instructions* of Mr. Poinsett solicited by myself, was simply to obtain, in the vicinity of Cape Florida, the remaining progeny of my few tropical plants, and transport them to said nursery, *where all vessels must necessarily come for water*. The U. S. Sloop Panther, Lieut. Shubrick, and the U. S. Revenue Cutter, Lieut. Coste, both under the control of the commander of the U. S. Wave, (which was *rarely* and *briefly* here,) were frequently cruising between Cape Florida and Indian Key during the winter, and both lieutenants readily promised this trifling assistance. After the return of Lieut. Shubrick from his ordinary cruise to the Cape, he informed me that he could not find a *single plant* snch as I described, although I had given him the printed documents and especial directions; but his *pilot* accidentally confessed that he had *pulled up some large leaved mulberries* in the garden of Mr. Dubose on the Miami river, and *transplanted them* in *Soldier's Key*, some miles south of the light house on Key Bizeains!! Lieut. Coste of the Revenue Cutter, then professed his willingness to remedy the defaults of the transport sloop; but instead of transferring my plants to the preparatory nursery on lower Malacumba, *he has actually continued to transplant them in his own enclosure on the opposite islet of Tea-Table Key*. Be it understood that Lieut. Coste occupies and claims this Key as his own, from the fact, that since September last, he has been clearing it, improving it, and building on it, *with governmental means* of men and materials; that he is thus converting said Tea-Table Key into a *town-site* for a rival port of Indian Key, under the apparent patronage of the inimical proprietors and public officers of Key West; and that hence, not content with speculating in *town lots*, he is determined to speculate also in *tropical plants*, by the *abuse* of the same governmental means. The detriment to the preparatory nursery, and consequently to the public progress of agriculture on this reef, will be infinitely greater than the individual benefit which can result to Lieut. Coste himself; as his confessed ignorance of the nature or culture of plants will be the cause of the destruction of most valuable species which might otherwise be multipled on lower Matacumba, both for a nursery of abundant supply, and a model of successful culture. You should be aware that such is the state of the limited society on this wrecking reef, that no injury can be easily prevented or redressed by due course of law; and, as I have learned, by a long course of painful experience, that it is less troublesome to endeavor to forgive injuries than it is to attempt to punish them, I simply relieve my feelings by thus exposing the facts to the agricultural community, who can sympathize with me for these outrageous obstacles to the progress of my great enterprise. Besides, were I even inclined to make formal charges against Lieut. Coste, to the proper department, I would not make them now, because I am persuaded that he will avoid the punishment of removal from office on the prior charges of speculating in town sites, and receive the reward of an appointment to office under the collector of Key West, say an inspectorship, which will enable him to continue at Tea-Table Key, and thus more effectually subserve the hostility of the monopolizing proprietors of Key West against the monopolizing proprietor of Indian Key. I never had, and never shall have, any personal interest in any of the rival islets of Florida; the Tropical Plant Company never shall have any connection with the rival proprietors, as partizans of interests of any Key in the Florida Reef; and as soon as the Seminoles may permit, I shall remove my family to some spot between Cape Sable and Cape Florida, to which a wrecking vessel cannot possibly come, and where even a wrecker's voice cannot possibly be heard. As Key West, by being a port of entry, has long enjoyed the

whole monopoly of the wrecking business on this reef, and as an additional port of entry would at the least divide the monopoly, the fact that memorials have been presented to congress in favor of Indian Key, and that it is at least very near the central position, or wrecking rendezvous, where the new port of entry must necessarily be made, furnish sufficient explanations of the hostilities of the proprietors and officers of Key West, not only to Indian Key itself but also to every site and enterprise in its vicinity, which may not be directly prejudicial to the prosperity of Indian Key. Hence you perceive that the evils of the public vessels cruising on these coasts; for while Lieut. Shubrick of the U. S. Sloop Panther became the temporary partizan of Indian Key, Lieut. Coste of the Revenue Schooner Campbell, has become the permanent partizan of Key West. The result of the whole to the nursery will be: 1st. As all regular mails are suspended, it will be impossible to procure any plants from the green houses of the states, or of Europe. 2nd. As the instructions of the Secretary of War will continue to be perverted, there will not be obtained any plants from even the vicinity of Cape Florida. 3rd. That as even the express instructions of the Secretary of the Treasury would as likely be perverted, we shall not be able to obtain from the steril Bahama island those valuable plants which will be equally valuable to these steril Florida Keys, as the collecter at Key West can easily avoid the employment of the waste time of a revenue cutter in that service to the public, and can as easily prevent a private vessel from being chartered for that purpose, by refusing her permission to transport the living plants *direct* into the nursery at the only proper season, the beginning of the rains in June next. 4. That hence for a whole year we shall have no plants to mutiply in the nursery, except those planted in boxes in 1837, in this islet, which have survived exposure to the gale; and that it will continue equally isolated from all facilities of communication and transportation for many years, unless public opinion shall compel the restoration of a regular mail, the establishment of a new port of entry, or the direct employment of public vessels in the importation of plants under the treasury and navy circular of Sept. 6th, 1837.

HENRY PERRINE.

REMARKS BY THE EDITOR. COMPARISON OF ESTIMATES.

Fearing that our readers had been surfeited with articles on the morus multicaulis, and especially those who had not been affected by the "mulberry fever," we had latterly endeavored to avoid subject. But the little zeal that now exists among agriculturists seems to have all taken this direction; and they either think and write about silk-culture and morus multicaulis, or not at all, at least for the benefit of the public. But the foregoing communication is from one in the *singular* attitude of an *opponent;* and therefore his views ought to be welcome to all among our readers who may disbelieve in the fitness of our country for silk-culture; and those of the contrary opinion may well agree that an opponent shall have full scope for his argument, and a respectful hearing.

Dr. Perrine has not mistaken our views, when he supposes that we concur, in the main, in the general propositions which he states, and which place the products and profits of silk-culture upon a footing of *something like equality* with those of other and ordinary agricultural pursuits; and we even more fully concur with him in withholding all confidence from, and awarding nothing but contempt to, the extravagant estimates of prospective profits, which have been published either through ignorance, or the desire to mislead and delude the credulous public. But, it must also be admitted, even if writers have the strongest desire to learn and to state the truth, that it is very difficult to prepare estimates of the cost and profits of a culture so new, and of which so little is known any where, without there being considerable errors made, and great discordance between the same items, as set down by different calculators. Therefore we are distrustful of all estimates, not founded on practical results; and no less so of our own ability to correct what we may consider as erroneous premises. For this reason, although believing Dr. Perrine's estimetes of products and profits to be generally too low, we shall offer corrections with the diffidence which ought to attend ignorance; and shall not presume to substitute any arithmetical statements as absolutely correct, and entirely unimpeachable. With this salvo, then, afforded by the confessed want of practical knowledge, and of full and correct information in regard to silk-culture—and after having admitted our concurrence in our correspondent's general propositions—we shall proceed to state our dissent from some particular items and premises, from which he deduces his objections.

Dr. Perrine supposes that 200 lbs. of leaves will be required to produce 1 lb. of cocoons. But Dandolo, whose authority is beyond question in all points which, like this, could be tested strictly by experiment, allows 1600 lbs. of leaves, "as gathered from the tree," to produce 120 lb. of cocoons, and which ought to be obtained from 1 oz. of eggs. This would give 15 lb. of cocoons instead of 10 lb. from 200 lb. of leaves—a difference of 50 per cent. in gross product, in this our item alone, and which might be equal to a difference of 200 per cent. in the net profit of the two rates of product.

Dr. Perrine's estimate of the quantity of cocoons required to produce 1 lb. of silk, is 10 lb. But Young states of several places in Italy that 8 lb. of cocoons made 1 lb. of silk; and this was the usual rate at Padua, where the general management must have been very bad, as 30 lb. of cocoons only were obtained from 1 oz. of eggs. (See Far. Reg. p. 275. vol vii.) In the more full and par-

ticular estimates made by Sig. Modena, of his operations in 1778 and 1780, in the one year it took only 6 lb. of cocoons, and in the other 7½ lb. to make a pound of good silk, besides all the inferior, (or refuse,) which was very considerable in amount. These are such unusual products, that they may well be distrusted, although stated with great appearance of accuracy. (See F. R. p. 274, 5, vol. vii.) It has been ascertained in this country, even north of Virginia, that 8 lb. of good cocoons will make a pound of silk. The difference, then, between 8 and 10 lb. of cocoons being required to make the same amount of silk is of itself more than 20 per cent. added to the gross product (and perhaps 50 per cent. to the net product) of the culturist who reaches the highest of the two grades of product.

The price stated for raw silk ($6 the pound,) is much too low for the European, of good quality, at this time; and it is understood that American silk has recently been tested in Europe, and is admitted by competent judges to be worth more than the European by $1 in the pound. The market value therefore may be computed at nearly double the sum supposed by Dr. Perrine—which of course, shows another very large percentage to be added to the net profit of the culture.

The valuation of mulberry leaves, (25 cents the 100 lb. on the tree, and 50 cents, if gathered and delivered at the cocoonry,) is also much too low. M. Carrier states that for the preceding 20 years in the Cévennes, (which may therefore be supposed to be similar in demand to France in general,) the price had been 5 francs the quintal, or 93 cents the 100 lb.; and, as it may be fairly assumed, without a particular estimate, that the leaves will be worth as much for feeding worms here, as in France, if the general returns of silk-culture are here as great as there; and if greater here, the leaves of course will be worth so much the more.

In making the foregoing corrections we have abstained from referring to any doubtful authority, or using any of the abundant, available and recent testimony, which might possibly be suspected of being influenced by the mulberry speculaton, or any other bias of self-interest, or of delusion. It is therefore that we have appealed principally to authorities so remote, in point of time or of position, as to be free from all such objection.

It may be objected to these corrections of Dr. Perren's premises, that he speaks of "common management," and that it might, and probably would, require *good management* to obtain the above products from the silk-worms. Admitted; but it should be also considered, that "common management" in Europe is decidedly "bad management;" and that *bad* management, in this business, is always more costly and less profitable than *good* management. In most cases of "common management," it is computed that half the worms perish by disease, or yield little or nothing. In Virginia, even upon first trials, and in ignorant hands, it is clearly seen that 5 per cent would be an unusual and unnecessary loss..

Though uninformed as to the product of leaves from any particular quality of land, whether the best, the middling, or the worst, we are induceed to believe that Dr. Perrine has allowed *too much*, (5000 lb.,) as the product to be expected from the "poorest soils." This admission, whether properly made or not, should however exempt us from the charge of wishing to make the most of his estimates, for the purpose of exaggerating the profits of mulberry or silk-culture. If taking as correct Dr. Perrine's own estimate of the crop of leaves, and also his manifestly too low valuation, (25 cents the 100 pounds,) it will make the amount $12 50 per acre, annually, for the value of the leaves, as standing on the tree; and every cultivator in Virginia knows that this is a much better profit than is obtained, not only from the poorest, but from those much better than the poorest soils —perhaps from half of all the land now cultivated in grain. For, after a few years' growth, mulberry plantations will need but little tillage or other expense, and the value of two-thirds of the crops of leaves, as they stand on the trees, must be clear profit. This would be, say, $8 clear annual profit from the poorest soils. Deduct one-half the crop, for supposed over-estimate, and still there would be $4 a year, per acre of clear profit. This product alone, contemptible as Dr. Perrine may consider it, if derived from all the "poorest soils" in the southern states, and which now yield no clear profit whatever, would be an immensely profitable change from the present state of things, both to the individual proprietors, and to public interests.

If then we should take Dr. Perrine's estimates without abatement or correction, they will go to prove the great profits which invite all southern cultivators to mulberry and silk-culture; and the deduction is so much the more valuable, as coming from facts and reasoning designed to show different results. And if the proper corrections be made in the three items—of product of cocoons from a certain quantity of leaves, of silk from the cocoons, and of the price of the silk—then the whole amount of profit will be much higher. It will then not appear so strange that, taken in either way, we consider Dr. Perrine's estimates as decidedly in support of the position that silk-culture must be highly profitable.

But we are not arguing for victory, but to ar-

rive at truth; and we readily admit that all arithmetical estimates of expense and profits, built upon doubtful premises, (as they must be on a subject so little understood as this,) ought to be received with much caution, if not distrust. We would discard all such grounds of estimate, as too uncertain to be confided in, and take different steps to reach our conclusion that silk-culture in this country will be sufficiently profitable, compared to other crops, to each individual undertaker, and of immense advantage to general interests. We base this opinion on the following sure grounds:

1st. Silk-culture in Italy and the south of France is generally conducted ignorantly and badly; and yet, on the whole, is in those origins a highly profitable culture. 2nd. Whatever products and profits are obtained there, might be as well obtained here, with no better management, and if the climates were alike. But our climate is undoubtedly and greatly better for silk-culture; and therefore better products may be counted on, from like management—and much better from proper management. 3rd. Even if a single acre of land in mulberry trees, for feeding silk-worms, should yield but as much profit as the same acre if in corn or other grain, still the change of part of every farm, from ordinary crops to the new product of silk, would serve to increase the profits of all the old diminished cultures, as well as to give the profit on the new. And the general and national benefitt from such change would be far greater than the mere sum of the pecuniary gain of all the individual cultivators. 4th. That besides the benefit of the change of culture, many thousands of acres of soils too poor for grain-culture would be put under mulberry culture; and other thousands of acres, which, though not poor, are either too hilly, too stony, too calcareous, or otherwise unfit for tillage.

On these grounds, together with the peculiar fitness of our circumstances, and superiority of our climate, (which we have formerly and fully treated of,) we are content to rest our claim of good and sufficient, though not very excessive profits of silk-culture in this country. Upon these grounds we rest our confidence, and shall direct our own private labors and operations, in silk-culture. These relative or comparative grounds cannot well be shaken, even if some of Dr. Perrine's allowances should prove to be too liberal, and the ordinary extravagant estimates should be made, as they deserve to be, the subject of universal derision and contempt.

AN ACT TO INCORPORATE THE TROPICAL PLANT COMPANY OF FLORIDA.

Section 1. Be it enacted by the Governor and Legislative Council of the Territory of Florida, that Henry Perrine, James Webb, and Charles Howe, and such other persons as shall become owners and holders of stock in said company, be, and they are hereby constituted and made a body corporate, by the title of the "Tropical Plant Company of Florida."

Sec. 2. Be it further enacted, that the capital stock of the said company shall be fifty thousand dollars, to be divided into one thousand shares of fifty dollars each, and in case the trustees shall hereafter find it expedient to increase the said capital, they are hereby authorized to do so from time to time, to any amount not exceeding in the aggregate one hundred thousand dollars, and to increase the number of shares in proportion to said increase of capital.

Sec. 3. Be it further enacted, that the company hereby incorporated shall be capable of holding such lands and hereditaments as they may acquire from the government of the United States, or from individuals, for the purpose of carrying into effect the objects contemplated by this act.

Sec. 4. Be it further enacted, that the said company and their successors, by their corporate name, shall be capable of sueing and of being sued, pleading and being impleaded, defending and being defended, answering and being answered in all courts and judicatures whatsoever and whatsoever, and also of contracting and being contracted with, and of purchasing and selling real or personal property, when necessary for the efficient prosecution of the business of said company, and shall have a common seal, which the said incorporators may alter, destroy and renew at pleasure.

Sec. 5. Be it further enacted, that books of subscription to the capital stock of said company, shall be opened under the direction of the trustees herein after named, or a majority of them, under the superintendence and direction of such person or persons, as they, or a majority of them shall designate and appoint at Tallahassee, Pensacola, St. Augustine and Key West, in the territory of Florida, and at Charleston in the state of South Carolina, and at New Orleans in the state of Louisiana, at such times as to them shall seem fit, which books shall be kept open for the space of ten days, or longer, if said trustees shall deem it necessary.

Sec. 6. Be it further enacted, that six hundred of the shares of said capital stock may be subscribed for and taken in the territory of Florida, two hundred in New Orleans, and two hundred in Charleston; but if any of said shares shall remain unsubscribed for at the time of closing said books at the several places herein designated, then and in that case, the said trustees may open books of subscription at such other places as they may think proper, either in said territory, or elsewhere, and the said remaining shares, unsubscribed for as aforesaid, may be subscribed for and taken by any person, whether a previous stockholder in said company or not; it shall be the duty of said trustees to require a payment of ten dollars on each share at the time the same is subscribed for, fifteen dollars in one year after said company shall have been organized, and the remaining twenty-five dollars in two years from its organization; and if any stockholder in said company, shall fail to make either of the two last mentioned payments, at the times specified, and for three months thereafter,

he shall forfeit for the use of said company, his said stock, and all payments made thereon.

Sec. 7. Be it further enacted, that the capital stock, property and affairs of said company, shall be managed by three trustees to be annually chosen by the said stockholders, after the whole amount of the capital stock shall have been paid in as aforesaid, and that the first election for said trustees shall be held at such time and place as a majorty of said trustees shall by publication for one month in some newspaper published in said territory direct, within three months after the said capital stock shall have been paid in as aforesaid.

Sec. 8. Be it further enacted, that Henry Perrine, James Webb and Charles Howe, shall be the trustees from the date of this act until the time appointed for said first election and until others are elected, and all elections shall be holden under the inspection of two managers to be appointed by the trustees for the time being, and shall be by ballot, and a plurality of the votes given at such election shall constitute a choise; but all absent stockholders shall be allowed to vote by proxy, and for each share shall be entitled to one vote.

Sec. 9. Be it further enacted, that no person shall be elected a trustee of said company, unless he be at the time, a resident in the territory of Florida, and the owner of at least twenty shares of the capital stock of the same; and if at any time after the election of any trustee as aforesaid he shall cease to be a resident of said territory, or the owner of twenty shares of the said stock, his situation as trustee shall be considered as vacant, and another trustee shall be appointed in the manner hereinafter pointed out.

Sec. 10. Be it further enacted, that if from any cause an election of the trustees shall not be made at such time or times as is provided for by this act, the said corporation shall not for that cause be dissolved, but it shall and may be lawful, to hold and make an election of trustees, at such other times as the by-laws and ordinances of said corporation shall prescribe, and in case any vacancy should occur in said board of trustees, by death, resignation, or otherwise, the remaining trustees are hereby authorized, by appointment to fill such vacancy, and the person so appointed, shall hold his office until the next election in the same manner, and shall possess all the powers and authority, which he would have been invested with, had he been duly elected by the stockholders.

Sec. 11. Be it further enacted, that trustees for the time being, or a majority of them, shall form a quorum for the transaction of all business of the company, one of whom shall be selected by the others, as president of the board of trustees, and they shall have power to make all such by-laws, rules and ordinances, as to them shall appear needful and proper, touching the management and disposition of the property, estate, and effects of the said corporation, and all such matters as appertain to the concerns of the association; but all such by-laws, rules, and ordinances, made as aforesaid, may be reviewed by the stockholders of said company, and upon the concurrence of two-thirds thereof, shall be rescinded, and no by-law of said company, which is repugnant to the laws, of this territory or the laws and constitution of the United States, shall have any force or effect whatsoever.

Sec. 12. Be it further enacted, that the stock of said company shall be assignable, and transferable, according to the rules which may be established by said trustees, but no stockhoder indebted to said company, shall be permitted to make a transfer of his stock, or receive a dividend, until such debt be paid to the satisfaction of the trustees.

Sec. 13. Be it further enacted, that the trustees shall at all times keep, or cause to be kept, at the office for transacting the business of said company, proper books in which shall be regularly entered, all the transactions of said company, which books shall be subject at all times to the inspection of the stockholders, and all trustees on going out of office, shall account to their successors, and pay over all monies of the company which remain in their hands, unappropriated.

Sec. 14. Be it further enacted, that it shall be the duty of the trustees, to call or appoint meetings, and notify the stockholders of the same, in the manner before mentioned, when required by stockholders owing one-fourth of the stock, and at all such meetings, absent stockholders may be represented to the extent of their stock, by attornies or proxies, duly constituted and appointed.

Sec. 15. Be it further enacted, that the said Henry Perrine, shall have the selection of the place deemed by him most suitable in soil and climate, for the establishment of a botanical garden and nursery for acclimating tropical plants, fruits, and flowers, provided, in making selection, he interferes with no private rights previously existing, nor with the laws and rights of the United States in relation to the public lands in said territory, and the said Henry Perrine, shall be the manager and superintendent of said garden and nursery, until he shall voluntarily relinquish the same, or remove from said territory, unless he shall be removed from the management and superintendence of the same, by a vote representing at least three-fourths of said stock; and the said Henry Perrine, shall be entitled to receive as a compensation for his services, the sum of twelve hundred dollars per annum, out of the profits accrueing from said stock, and if the said profits shall at any time amount to the sum of twelve per centum, or more on the capital invested, the said salary may be increased to any sum, not to exceed two thousand dollars per annum, at the discretion of the trustees for the time being.

Sec. 16. Be it further enacted, that if at any time, there should occur a vacancy in the office of superintendent and manager, it shall be the duty of the trustees for the time being, to appoint some other suitable person to fill said vacancy, which appointment shall be of force until the next regular election for trustees of said company, at which said election, there shall be a superintendent and manager chosen, by the holders of a majority of said stock, or their representatives; but no person shall be appointed or elected to said office, who is not the owner of at least twenty shares of said stock, and who is not a resident of said teritory.

Sec. 17. Be it further enacted, that the said trustees shall at all times, have the power and authority, to appoint all such other officers and servants as they may deem necessary for the transaction of the business of said corporation, and to displace them at pleasure, and shall allow them such compensation for their services, as they may deem right and proper.

Sec. 18. Be it further enacted, that such of the stockholders as may prefer it, shall be entitled to receive their respective dividends of profits, in any seeds, plants or other articles, cultivated in said garden by said company, in procuring the same or similar articles.

Sec. 19. Be it further enacted, that it shall be lawful for the said trustees, for the time being, to raise by lottery, in such scheme or schemes, as they may deem appropriate and advisable, a sum of money, not to exceed ten thousand dollars, which sum of money, after the payment of expenses of conducting said lottery, shall be wholly appropriated under the direction of said trustees, 1st. to the procuring and purchasing a sufficient botanical and scientific library, for the use of said company. 2d. to the procuring and purchasing the tools, implements, and machinery necessary to the conducting and carrying on the business of said company. 3d. to the paying and compensating, to such extent as the said trustees shall deem reasonable and just, the said Henry Perrine, for such exotic and other plants, as he may have already procured, and shall turn over to said company; and 4th. to the procuring from time to time, from foreign places, such other seeds and plants, as are valuable, and may be rendered valuable to said territory, by their cultivation and acclimation therein. And said lottery shall be conducted by such managers and officers as the said trustees shall appoint for that purpose; provided, that all such managers and officers shall give bond and security in such sum or sums, as said trustees shall direct, faithfully to conduct said lottery; and provided also, that said managers and officers shall not be entitled to receive for their services, a sum, which in the aggregate, will amount to more than five per centum upon the money raised by said lottery.

Sec. 20. And be it further enacted, that this charter shall last, and provisions of this act continue in force, for the term of twenty years, from the time when said company shall be organized.

Passed February 6th, 1838.—Approved Feb. 8th, 1838.

To the friends of the enterprise.

The principal objects of the company, are to form a nursery of supply and a model of cultivation of the valuable plants of the tropics.

As, however, while Indian hostilites continue, it will be impossible to pursue with safety their intended labors on the main land, of Tropical Florida, the trustees will delay the organization of the company, and will apply their personal resources to the formation of a preparatory nursery at Indian Key, and the adjacent inlets. The superintendent, Dr. Perrine, will hence reside with his family at Indian Key, until the cessation of the Seminole War, where he will continue to accumulate all the seeds, plants and other elements for the permanent nursery, to be then established on the southern coast of the Peninsula. During this important interval, the most *essential aid* to these preparatory labors may be *immediately afforded* by very *easy means* in the power of many philanthropic friends of this patriotic enterprise.

1st. By transmitting to Indian Key, at least two seeds or cuttings, &c., of every superior variety of every valuable vegetable, which the possessor may consider adapted to the climate and soils of Tropical Florida.

2nd. By transmitting a detailed list of all books which the owner may deem necessary to enter into a botanical and vegecultural library, especially adapted to the tropical climate and productions of South Florida.

3rd. By transmitting a letter containing the desires of the writer in respect to the purchase of one or more shares of stock, in the Tropical Plant Company.

The trustees do not expect to receive any articles or services without returning an ample equivalent. All letters should be addressed to Charles Howe, postmaster, at Indian Key, South Florida, the financial trustee. All packages of seeds, &c., not exceeding two ounces, should be directed to the Patent Office at Washington, whence they will be forwarded to Indian Key. The proprietors of Green houses, &c. will render themselves especial services by sending their respective mites during the ensuing six months.

Even the druggists may contribute the valuable seeds, occasionally found among their tropical medicines. The trustees are James Webb, judge of the district at Key West; Charles Howe, inspector of the port at Indian Key; and Doctor H. Perrine, late American consul at Campeachy.

Indian Key, Tropical Fl., 25th Dec., 1838.

THE "MARL INDICATOR," NOT THE VERONICA ANAGALLIS," NOR "VERONICA BECCABUNGA."

To the Editor of the Farmers' Register.

June 9th, 1839.

I have perused the communication in the last number of the Farmers' Register, headed "The Marl Indicator, not a new species," over the signature of "Clayton." When I handed you the botanical description of the "indicator," I had not an opportunity of consulting any other authority than Loudon, nor have I any other now, except those published by the correspondents of Clayton, as stated in his communication. I would here take the liberty of respectfully submiting, that, to the best of my judgment, the marl indicator is *not* identical with either of the species of *veronica* described of the two correspondents of Clayton. The indicator agrees in some of its characters with the *veronica anagallis* (as described by the lady of Pennsylvania,) but differs so far from it in others, as to entitle it to be considered an entirely different species. From the species *veronica beccabunga*, the indicator differs widely; the leaves of the *beccabunga* are petiolate, those of the indicator are strictly amplexicaul, so much so as to appear at first glance, perfoliate. As formerly explained by you in the Register, the engraving of the indicator, does not correctly delineate its botanical characters; the artist who furnished the representation from which the engraving was taken, having overlooked the amplexicaul character of the leaves, representing them as petiolate; the error though important in a botanical point of view, might easily escape the notice of an artist who probably was not a botanist. In every other respect the engraving is a correct representation.

I considered the botanical description, accompanying the engraving of the indicator, sufficient to identify the growing species; but having another very fine specimen before me, upwards of two feet high, I will again more minutely repeat its botanical characters, as they present themselves in the specimen before me. Root fibrous, stem glabrous, (entirely free from pubescence,) ramose; leaves opposite, amplexicaul, lanceolate, slightly serrate; flowers racemose, axillary, terminal; calyx four-toothed; corolla light-blue, entire base, lip four-parted, reflexed, capsule two-celled; habitat, so far as I have observed, strictly confined to the eddies formed in streams supplied with calcareous matters.

The above description is, I believe, essentially correct, and such as will enable any botanist easily to identify the growing plant. I am still of the opinion that the indicator is a species of veronica not formerly described.

———.

[It is the rule for this publication that every article shall have a title indicating its purport; and when the writer of any communication does not prefix such a heading, it is always done by the editor, who therefore must be charged with any unfitness or impropriety, that may be found in the titles to communications, in the great majority of cases. In conformity with this rule was prefixed to Clayton's communication the heading which reads "The Marl Indicator, not a new species," designing by it merely to announce the views which the writer presented—and without thinking at the monent, as has since occurred to our mind, that the words conveyed a more positive assertion than the writer himself would have made—or that, if charged to its proper source, it might seem that the editor took sides against the first describer of the plant, on a point in dispute in regard to which he is confessedly ignorant. There was no such intention; but, on the contrary, a wish to place on fair ground both sides and opinions, on a new and interesting question.

It has been requested by the 'Farmers' Cabinet' that a dried speciment of the "Marl Indicator" should be furnished for examination. This cannot well be done, so as to preserve sufficiently the natural appearance of the plant, owing to its being so extremely tender and watery. But the plant can be found from May to August in every rivulet flowing from or through a marl-bed, and can be readily recognized by the description and representation already furnished.—Ed. F. R.]

ENGLISH (OR COMMON) TURNIPS.

From the Maine Farmer.

In No. 7 of the present vol. of the Farmer, Mr. H. Butman states his opinion of the small value of English turnips as food for cattle. I have had some experience in raising and using that kind of turnips for fattening oxen, and cows, and have in six or eight instances fatted an ox or cow for my own use with English turnips, and always successfully. In one instance I suffered a cow to be milked until the 20th of September, and from that time to the 1st of November she had good feed upon grass only—at which time she was put into the stable, and fed with English turnips and hay, without any water, and kept constantly in the stable until the 1st of January, and was then excellent beef. The only additional food given to her was two bushels of Indian meal given to her during the last two weeks in December.

PERIODICALS OFTEN AFFECT THOSE WHO DO NOT READ THEM.

From the Cultivator.

J. Buel,—Sir,—I am disposed to mention one fact, which may encourage you in your arduous labors, and which may also show the important and responsible situation of editors and conductors of public journals.

In the course of the last summer a neighbor of mine invited me into his orchard to witness the effects of an experiment he had made, at the suggestion of another. Last winter one of his apple trees of considerable size was peeled around near the bottom by mice. He took four or five cions from the top of the same tree in the spring, and inserted them in the bark, one end below and the other above the naked trunk, in the manner of side grafting. When I saw the tree (perhaps in August) it was growing very vigorously, the sap having passed through the inserted cions. On seeing this I was determined to send you an account of it, that it might be spread out before the public in the Cultivator. Not long after this occurrence, I was reading one of the first volumes of this excellent work, which I had recently received, and found a description of a similar process there. I know not through how many hands this information had passed before it reached my neighbor, but it is certain he himself had not read it in the Cultivator. I mention this to show, that however extensively a useful publication may be circulated, its salutary influence may extend to hundreds, and thousands, who may never see it. On the other hand, let a publication be circulated containing articles which may be hurtful to the best interests of man, and its deleterious effects may be felt by thousands and millions, long after the publisher may have gone to give up his last account before his final Judge. O, how unspeakably important that every editor, and every one who presents any thing before the public eye, should never publish any thing but that may be useful to some one, either for time or eternity.

PLANTING SEED ENDS OF POTATOES. COMPARATIVE NUTRITIVE QUALITY OF ROOTS.

From the Maine Farmer.

Although potatoes are sufficiently plenty with us in this state, yet on account of the great demand for them at the west, they are uncommonly high in price. It is well therefore for those who

are under the necessity of purchasing to be somewhat economical in the use of them. The seed ends cut off are nearly or quite as good to plant as the whole potato, and the remainder will continue as good or better to cook. Loudon asserts that the seed ends of potatoes will come up a fortnight sooner than the other end. We do not know this to be the fact; but if it be, it is an important one to the potato cultivator. Many farmers are in the habit of cutting the potatoes which they plant into several pieces and planting them promiscuously; but if the seed ends are so much earlier than the other parts, it certainly would be good policy to plant them by themselves, or plant them only, and use the other for other purposes.

Our correspondent R. and some others think they have hitherto held the ruta baga in too high esteem; and some are now engaged in crying them down, as much as they cried them up before. Now truth lies in the mean or middle way between the extremes. We have hitherto had some little experience in feeding different kinds of roots, to cattle and pigs in the winter.

We still hold them in high esteem. Some for one purpose and some for another. It is true that some of them rank higher in intrinsic qualities as food for man than others. The potatoes, for instance, are better for man, because they contain more farinaceous matter or starch than any of the others; but some of the others, but more especially carrots, are better for fattening or sustaining cattle.

One thousand parts of the potato yields of nutritive matter from 200 to 260 parts. This consists principally of starch with a little mucilage—from 15 to 20 of saccharine matter, and from 30 to 40 of gluten.

One thousand parts of the common red beet contain about 150 parts of nutritive matter, which is made up of 14 parts of starch, 121 of saccharine matter, and 13 or 14 of gluten.

One thousand parts of the mangel wurtzel contain about 136 parts of nutritive matter, of which say 13 parts are starch, 119 saccharine matter, and 4 gluten.

One thousand parts of the common flat turnip contain about 42 parts of nutritive matter, of which 7 are starch, and 34 are saccharine matter.

One thousand parts of ruta baga contain 64 parts of nutritive matter, of which 9 are starch, 51 saccharine matter and 2 gluten.

One thousand parts of the carrot yield 98 of nutritive matter, of which 3 are starch and 95 are saccharine matter; it also contains 2 or 3 parts of an extract which appears insoluble.

One thousand parts of the parsnip afford about 100 of nutritive matter, 9 or 10 of which are starch, and 90 saccharine matter.

The remainder of the thousand parts are vegetable fibre, useful to the animal that eats it in filling the stomach and aiding the digestive organs by what is called the "stimulus of distention," and very probably affording other aid to them, which we know nothing about and which cannot be detected by the chemist in his laboratory.

Compare almost any of the above roots, with the nutritive matter procured from the same number of parts of clover, or herds or timothy grass, as they call it at the south (*phleum pratense.*)

One thousand parts of the clover contain about 40 of nutritive matter, of which say 31 or 32 are starch, 3 are saccharine matter, 2 are gluten and 3 are an insoluble vegetable extract.

There are different results obtained by chemists, in regard to the nutritive qualities of herds grass, but some put it down as 100 in a thousand parts.

Now if we take into the account the number of lbs. of each root which is ordinarily obtained from an acre, and the cost of production, an approximation may be had of the comparative value of each crop; and by fairly understanding the matter we shall not be likely to be carried away by our partialities for this or that crop to day, or by disappointments in regard to them to-morrow.

HEN COOPS.

From the Maine Farmer.

Hens are useful—valuable, and as profitable as any stock on the farm; but like other stock they should have an enclosure by themselves at certain seasons of the year, especially in the spring when the sowing and planting begins. A very cheap and convenient yard may be made for them by taking common boards, and a suitable number of posts—nail the boards so nigh together that the hens can not get through between them. This frame need not be more than four or five feet high. Then at the top nail on some shingles cut so as to make sharp points, and nail them up say two inches apart. Laths cut and nailed on are better—or narrow sticks split and made sharp, and nailed on, will, answer the purpose. A door of convenient size may be made to go in at. The hens may then be put in and there will be little danger of their attempting to scale the walls. The sharp points sticking up all round, look too formidable. The philosophy of the thing, is this. The hen is not very good for flight, and when she attempts to fly over any thing, she almost invariably lights upon it, and then jumps off. As they cannot light and rest upon these sharp points, they cannot get over very conveniently, and should any succeed in flying over at a single leap, their wings may be clipped. When put into one of these coops, food should be kept by them constantly, and also water—a little ashes for them to shake up among their feathers in a sunny day, some gravel to grind their food with, and some lime to manufacture into egg shells. When thus supplied, they will lay as well, and do as well here as when out ranging about. We keep our hens and turkeys in such a yard, and find that they do extremely well.

SOAP MAKING

From the Genesee Farmer.

We recently mentioned some of the necessary requisites in the manufacture of common soft soap, without an attention to which, failure would be the consequence. We have since been furnished with the following particular statement of the whole process by an experienced manufacturer, who has never, in a single instance, failed in making good soap by this method.

The leach-tub should hold about four barrels. In the bottom of it put a little straw to prevent the

ashes from falling through. Put in a pailful of ashes and pack it down. Then put in two quarts of *quick-lime;* fill the tub with ashes, packing it closely with a pounder, and leaving the upper surface concave so as to hold two or three pails of water. Fill this cavity with hot water as fast as it soaks in the ashes, till ten or twelve pails have been poured in. Let this be done in the evening. Let it remain about 12 hours. If the ley begins to run from the leach-tub in this time, try it with an egg; if it bears the egg, it is strong enough. If it has not begun to run at the expiration of the twelve hours, add cold water until it does. If it will not bear an egg, pour the ley upon the ashes again, until it becomes sufficiently strong. If the ashes are good, this quantity will make a barrel of soap.

Put the soap-grease into a vessel over the fire, stir it frequently until it boils, then add a small quantity of ley and make it boil. Add sufficient ley at intervals of about two or three hours, to have two gallons of ley to four pounds of grease. If the ley should begin to run weak before a sufficient quantity is obtained for this purpose, do not add it until the previous contents of this kettle have boiled nearly enough, except a little should be necessary to prevent its boiling over. To ascertain whether it has boiled sufficiently, mix a small quantity of the newly made soap with an equal bulk of water, and let it cool. The appearance will at once show if the soap be good. When this is found to be the case, add as much cold water as there is ley, stir it well, and the work is finished.

If the ashes are not packed closely enough, the water passes through too rapidly and the ley is weak. If packed too closely, the water cannot get through during the twelve hours. There is however, little danger of the latter.

If the ley is not strong enough, it will require sometimes a day or two of boiling before good soap can be made. This should, therefore, be previously well attended to.

If the ley should stand a day, it will not unite with the grease; or if it should, they will separate when they become cold. This appears to be owing to the combination of the carbonic acid of the air with the potash of the ley, rendering it less caustic. If so, the evil might at once be removed by the addition of quick-lime to the ley.

It appears that the corroding quality of soap is owing to a deficiency of grease. If this is the case, the addition of an excess of lime, in making the potash caustic, would not produce any bad effect.

Good soap is sometimes made from ashes of the maple without any lime, but beech ashes absolutely require it.

The consistency of the soap is in a great measure regulated by the addition of water at the end of the process. If the soap is too thick and brittle, it is very liable to become wasted in using. To be in the best condition, it should be quite tenacious.

To preserve the grease from becoming mouldy or spoiling, it should be kept in weak ley.

A pine tub is the best thing to keep the soap in —an old tar barrel answers admirably although it imparts a dark color to the soap at first, but does not injure it. Oak has the texture soon destroyed by the soap, and the tub bursts open.

THE AGRICULTURAL INTEREST.

From the Genesee Farmer.

We are happy in giving the following extract from a letter to us, from Mr. Triplett, of Kentucky, on the important subject of legislative aid to agriculture. We have the more pleasure in doing this, as the sentiments are just and forcibly expressed, and agree with the opinions so often expressed by us in the Farmer, and which we are confident will ultimately prevail. It is but a few days since an honorable senator, in his place at Albany, declared, that the project of aiding agriculture by legislative enactments, was "*the most arrant quackery.*" If quackery, in this case, why is not aid from the same source, quackery in other cases? It was this legislative quackery, that incorporated our colleges, and *endowed* them; that surrounded the professor of the law with exclusive privileges and numberless ways of acquiring wealth and power, that are forbidden to the people; and by so doing, placed *that man* in a situation to sneer at, and injure those who aided his rise. When what are termed the professions ask for aid, the vaults of the treasury are thrown open; when those who have deposited the cash there, ask for the *use* of a few thousand dollars of their own money, they are repulsed with taunts and sneers. The evidence is daily becoming more clear, that farmers must see to their own legislation, or it will be left undone. But to our correspondent:—

"Considering the vast importance to our country, of the agricultural interest—it being the very basis of all others—without the prosperity of which all others dwindle—it is strange that it is so overlooked and neglected in the legislation of our country. Manufactures, commerce and navigation, are all found to be benefited by a little legislative aid, but agriculture is supposed not to need it. I am against too much legislation. It is one of our errors, and ever will be in a republic. But while there is too much on other subjects, there is too little on agriculture. I will illustrate the evil felt in some instances, and show how legislation might remedy it. We see accounts in the journals, of the day, of improved farming implements, and labor saving machines, &c. A farmer purchases, say, a reaping machine. It does not answer. He curses the impostor, and forswears all humbugs. He is told he did not get the right article. But how is he to know the right one? Certificates have little value; we believe in none of them. In the course of time perhaps a neighbor gets the right implement, and when he sees its operation, he will buy one. I have had myself a knowledge for several years of various improvements, which I have been anxious to adopt, but have waited to see them introduced and proved by others; not wishing to be humbugged myself. In these improvements, real ones spread but very slowly. How rapidly would our prosperity advance, if the march of those improvements could be expedited, and show how much could that be done, if each state would have a *model farm*, where all reported improvements could be fully tested, and reported on by authority that could be confided in; and where the operation of the thing itself could be seen. There, too, manufactories of the most improved articles could be established, and the implements or machines fur-

nished at the most reasonable rates. Pure seeds, plants, &c., could also be had at such a farm; and what would be the expense? $6,000 per annum would borrow $100,000, which would amply suffice for the establishment, including a large farm, which would be annually increasing in value, and the income from which might be made, by good management, much, if not all of the interest on the cost: for the implements, seeds, &c., would all be considered as proved, and the demand, for them would be almost unlimited. There, too, could be demonstrated the best methods of agriculture in every branch. Much speculation would be put to rest. Any improvement, when shown to be such, would be quickly adopted, and agriculture advance with rapid strides. I do not pretend to say, there may not be more advisable modes of advancing the agricultural interest; but I am well convinced that such a plan would render it a great service. The best stocks of domestic animals could be concentred on these farms; all grains, seeds, implements, machinery, &c. &c., and an agricultural school might be attached to it.

Such plans, or similar ones, I believe, have been repeatedly suggested; but it seems, that as yet, the public mind has not been sufficiently enlightened to be ripe for it. I think, however, that every agricultural journal ought to urge it, until the subject is taken up, and some such plan adopted."

SHEEP TICKS.

From the Genesee Farmer.

Farmers sometimes ask how they shall contrive to free their flocks from the sheep tick, since every one is aware that if these pestiferous insects abound, it is impossible to keep the animal in good order, or prevent a serious diminution in the quantity of wool. Some have recommended mercurial ointments, but these are always dangerous, and should only be resorted to in cases of necessity arising from disease, such as the scab, or other obstinate cutaneous diseases. Some have proposed dipping in an infusion of tobacco, and this would, in our opinion, be preferable to ointments containing mercury; but this occasions considerable trouble, and to be efficacious, must be performed with more care than is usually given to such matters.

We will tell how we manage this matter. We do not keep a large flock, only one or two hundred, yet our system is applicable to any number, and for several years past not a tick, or scarcely one, has been seen on our sheep. In the first place, we wash our sheep in a large tub, of such capacity that the sheep cannot reach the bottom, and wide enough at top to allow two to wash at once. The tub is kept full and running over slowly, by a small stream conducted into it of clear, pure water. In washing our sheep, soap is always used at the rate of about two gallons to a hundred, and after a few have been washed, the water in the tub will be strongly impregnated with soap, or in other words, will be soap suds. This cleans the wool and the sheep thoroughly, and by letting the sheep remain a few days after washing in a clean pasture, the wool becomes again saturated with the oil which is so essential to its softness and elasticity. This is the first step in freeing the animal from ticks. At shearing, it is well known, when this operation is performed as it should be, and no places where it is only half cut by the shears, or taglocks around the belly and legs are left to give the vermin a hiding place, that they will quit the old sheep for the lamb, in the wool which they find a secure place of retreat. To get rid of them fully and finally, we now *shear our lambs*. Some farmers apprehend that such a process would injure the lambs, but the experiments we have purposely made, and the experience we have had, has convinced us that such fears are groundless, either as respects the animal itself or the effect on the next clip of wool. Let any farmer whose sheep are rendered poor and sickly by the constant irritation of these insects, try washing them in soap suds, and at the proper time shearing the lambs, and we think he will make no more complaints of ticks on his sheep.

CURE FOR GRUBS IN HEAD OF SHEEP.

From the Genesee Farmer.

Having read considerable in the Genesee Farmer concerning diseases in sheep, and seeing no account of the grub in the head, I think proper to give the public a relation of a circumstance which took place with me when I had a small flock of sheep. It was in the latter part of winter, one of my flock was taken sick, and became so week it could not rise without being lifted. I suppose its ailment to be the grub in the head; and knowing something of the virtue of flax-seed oil, I resolved to try an experiment on it. I laid the sheep on its rump, or rather on its back, with its nose a little inclining backward, and poured in near a table spoonful of the above oil, part in each nostril. The next morning the sheep was able to get up and eat with the rest of the flock, and speedily recovered. After that, and while I kept sheep, when I discovered any of them snotty-nosed and coughing, (an indication of the grub,) I put a little oil in their noses as above, and they soon became clean and healthy. I do not remember that I failed in one instance; some of my neighbors also received benefit by the above process.

T. B.

Columbiana county, Ohio, 5th mo. 18, 1839.

IMPROVED DURHAM SHORT-HORNS.

[Subject continued from page 350.]

From the Whip.

What we have said, it is considered, will render superfluous any attempt more particularly to describe the short-horns. Of course they will be found to vary greatly; but sufficient may be collected from what is presented to the reader to inform him as to the character of this superior breed of cattle. The next object, then, will be to show their capabilities to make a return for food consumed, and the unparalleled early period at which such return may be made. Indeed, *early maturity* is the grand and elevating characteristic of the short-horns, and their capacity to continue growing, and at the same time attaining an unexampled ripeness of condition at an early age, has

excited the wonder, and obtained the approbation, of every looker-on not blinded by prejudice.

In order to do justice to the subject, and to show that these properties are not all of recent acquirement, but were possessed in an eminent degree by the Teeswater cattle, as well as the improved short-horns, it will be requisite to return to the former for a few facts in evidence.

About fifty years ago, Sir Henry Grey (of Howick) bred two oxen, which were fed by Mr. Waistel, and when six years old weighed 130 stones each, 14lb. to the stone; their inside fat being most extraordinary.

A heifer, three years old, bred by Miss Allen (of Grange) fed on hay and grass alone, weighed 90 stones.

Two three-years' old steers, bred by the same lady, and similarly fed, weighed respectively 92 and 96 tons.

Mr. Waistel's four-years' old ox, by the bull supposed to be the grand-sire of Hubback, weighed 110 stones.

A four-years' old ox, bred by Mr. Simpson (of Aycliffe) fed on hay and turnips only, weighed 135 stones.

About the same period, a five-years' old heifer, bred by a bishop of Durham, weighed 110 stones.

A cow of Mr. Hill's slaughtered in Northumberland, weighed 127 stones.

Mr. George Coates, before-mentioned, slaughtered a heifer, by the supposed sire of Hubback, which, fed on turnips and hay, weighed, at two years and two months old, 68 stones.

An ox and heifer, bred by Mr. Watson (of Manfield) weighed, at four years old, within a few pounds, 110 stones each.

A sister to Mr. G. Coates' *Badsworth*, having run with her dam, and fared as she did, without cake or corn, met with an accident, and died when seven months old; she weighed 34 stones.

A steer, by a brother to the above heifer, three years and two months old, weighed 105 stones, and another steer, by the same bull, exactly three years old, weighed 95 stones. Both were kept as store-beasts till two years old.

An ox, bred by Mr. Hill (of Blackwell) slaughtered at six years old, weighed 151 stones, 10lb; tallow, 11 stones.

The Howick red ox, seven years old, weighed 152 stones, 9lb; tallow, 16 stones, 7lb.

Mr. Charge's ox, seven years old, weighed 168 stones, 10lb; tallow, 13 stones.

The foregoing instances of weight and proof satisfactorily show, that in the Teeswater cattle, Mr. Charles Collins had pretty good materials with which to commence operations. Let us now refer to a later period, and state some particulars respecting their decendants, the improved short-horns.

In the year 1808, Mr. Baily, the agricultural historian of Durham, informs us, he saw, at Mr. Mason's (of Chilton) a cow, not less remarkable in point of fat than the Durham ox. At that time, the depth of fat, from the rump to the hips, in a perpendicular position, was not less than twelve inches; and the shoulder score, at least nine inches thick.

Mr. Robert Colling's heifer, which, like the Durham ox, was exhibited as a curiosity, was estimated, at four years old, to weigh 130 stones.

The same gentleman sold, in Darlington market, on the 18th of April, 1808, a two years old steer for £22; the price of fat stock being at that time seven shillings per stone.

At Mr. Nesham's (of Houghton-le-spring) Mr. Bailey saw a steer, 25 months old, completely covered with fat over the whole carcass, and supposed to be the fattest steer of his age ever seen. Butchers estimated him to weigh 75 stones. Neither of the last mentioned were of large size, and would not have weighed above 40 stones had they been no fatter than those usually slaughtered.

Mr. Wetherill (of Field House) sold at the fair in Darlington, in March, 1810, two steers, under three years old, for £47 10s. each. The price of cattle at that fair, 10s. per stone.

Mr. Arrowsmith (of Ferryhill) who fed off his short-horns at two years old, furnished the following particulars of the prices he obtained from the butchers: viz.

In 1801, sold four for £25 each; two steers and two heifers.

1802, six for £17 10s. each; three steers and three heifers.

1803, four for £17 each.

1804, six for £18 10s. each.

1805, six for £17 10s. each; two steers and four heifers.

1806, four for £16 each.

1807, eight for £18 each.

1808, eight for £19 each.

The time of selling, from the beginning to the latter end of May. Management. In the first winter they got straw in a fold-yard, with nearly as many turnips as they could consume; in May they went to grass; in November put to turnips through the winter, and turned to grass the first week in May.

A twin heifer, belonging to Mr. Arrowsmith, calved the last week in April, being kept the first year as the store-stock, was entered for a sweepstakes, to be shown in June, at which time she would be two years old. She was immediately turned to grass in the usual pasture. In November she was estimated to weigh 28 stones; when she was put to the ruta baga and hay, and oil cake, of which she ate 4 cwt., with two bushels of beanmeal and 1 bushel of barley. She went to grass again on the first of May, and from that period had neither cake nor corn. On the 23d of July, it was the unanimous opinion of the best judges that she weighed 58 or 60 stones; having gained 30 stones in 30 weeks.

In April, 1808, Mr. Hailey saw, at Mr. Arrowsmith's, eight yearlings, intended for the course of feeding described as adopted by that gentleman; whose sales, from 1801 to 1808 inclusive, have been already particularized. They were very lean, not more than 15 stones each; and had they been offered for sale in a fair, no person, unacquainted with the breed, would have given more for them than £4 10s. or £5 per head.

Mr. Walton (of Middleton in Teesdale) had been, in 1808, in the habit of selling his steers, at two years and a quarter old, at from £20 to £30 each; their weight being 50 to 54 stones, fed solely on vegetable food. He often, for the sake of experiment, bought in calves of the unimproved, or old breed of the county, and he uniformly found that his own at two years old got fatter, and fitter for the butcher, than the others did at three, although fed and kept exactly alike.

Mr. Mason (of Chilton) in the course of an experiment to ascertain the weight of beef gained by the food given, (turnips,) found three steers, under 3 years old, to have gained 20 stones each in 20 weeks. The three steers averaged 70 stones each.

In 1816, Mr. Nesham's steer, three years and a half old, obtained the premium offered by the Durham Agricultural Society; his weight was, 4 quarters, 96 stones, 1½lb; tallow, 11 stones, 7lb; hide, 8 stones.

Major Rudd (of Marton in Cleveland) obtained the premium offered by the Cleveland Agricultural Society in 1811, for the best steer under three years old, and fed on vegetable food. The steer was sold to the butcher for 10s. per stone, and slaughtered when three years and thirteen days old; the weight of his 4 quarters was 96 stones.

The late Mr. Robertson (of Ladykirk, near Berwick-upon-Tweed) furnished the writer with the following particulars of short-horns, bred by him, and fed with few exceptions, on vegetable food:—

1794—An ox, four years, ten months old; 4 quarters, 145 stones, 3lb; tallow, 24 stones, 7lb.

A steer, under four years old; 4 quarters, 106 stones; tallow, 19 stones, 7lb.

1814—A steer, three years, nine months old; 4 quarters, 101 stones; tallow, 15 stones.

1815—A steer, three years, eleven months old; 4 quarters, 112 stones, 7lb; tallow, 26 stones.

A heifer, three years, eight months old; 4 quarters 89 stones.

1817—A steer, three years, two months old; 4 quarters, 95 stones, 10lb; tallow, 17 stones, 10lb.

1822—An ox, four years and a half old; 4 quarters, 135 stones; tallow, 21 stones.

Own brother to the foregoing, three years and a half old; 4 quarters, 133 stones; tallow, 21 stones.

A steer, three years, ten months old; 4 quarters, 124 stones; tallow, 17 stones.

A steer, three years, eight months old; 4 quarters, 112 stones; tallow not weighed.

A steer, bred by Col. Cooke (of Ouston, near Doncaster) fed on potatoes and straw, was slaughtered when two years and twenty-two days old; his 4 quarters weighed 72 stones.

Mr. John Rennie (of Phantassie) produced, at the East Lothian Agricultural Society's meeting, in November, 1823, a steer, from eighteen to twenty months old; the 4 quarters of which weighed 118 stones, 1 lb. Smithfield weight.

The same gentleman produced before the Highland Society of Scotland a steer, aged two years, four months, whose 4 quarters weighed 153 stones, 7lb: also a steer, aged three years, six months, whose 4 quarters weighed 1169 stones, 7lb.; tallow, 30 stones, 1lb.

Except in the three last instances, all the weights given have been by the stone of 14lb.

Should the foregoing statement be considered to have been unreasonably extended, it is presumed it will, at least, be admitted, that its ample detail, if attended to, will establish the credit of the short-horns as an invaluable breed to the grazier.

We will take a very rapid survey of the few counties not already decribed, and in which the short-horns are the prevailing breed.

Cumberland.—The native breed of Cumberland was a small long-horned beast, yielding a fair quantity of milk, and of good quality; answering well for the dairy, but not so profitable as grazing cattle. With these were intermingled the Kyloes and the Galloways, both of them quicker feeders than the old Cumberlands. They were generally bought in about October, and turned all the winter on the pastures out of which the fat cattle had just been sold—a little hay being allowed them, according to circumstances. They were kept about a twelvemonth and paid very well.

The long-horns were most used for the dairy, and chiefly for the production of butter. They yielded from one to two firkins per annum, according to their goodness and size: the average produce was about 84lb. per cow. Some of them would yield eight quarts of milk per day during the season, and three or four pounds of butter per week. The Cumberland butter used to be in considerable request. The cheese was an inferior article, and chiefly made of skimmed milk.

The short-horns were not slow in penetrating into Cumberland, and establishing themselves there. They were first used to cross the native and Scotch breeds, and sometimes with considerable success. Mr. Bates, of Halton Castle, attempted a cross between the Kyloe cow and the short-horn bull. His object was to increase the quantity of milk from the Kyloe, and to preserve its quality; and to gain that, which every one used to imagine the short-horn was sadly deficient in, hardiness. He hoped likewise to reduce the great consumption of food by the short-horn, and at the same time, to retain his early maturity. To a very considerable extent he succeeded. Mr. Maynard, than whom there could not be a better judge of cattle, and from whose stock descended some of the best short-horns of the north, hired a bull from Mr. Bates, to try what effect would be produced on some of his own pure breeding stock. That the short-horns could be materially improved by such an admixture could scarcely be expected; but the value of the old breed of the country has been materially increased.

The pure short-horn is now zealously cultivated in Cumberland, and by none more so, or more successfully, than by Mr. Maynard.

Yorkshire.—North Riding.—There are few parts of the kingdom in which so perfect a change has taken place in the breed of cattle as in this extensive division of Yorkshire. Mr. Marshall, who is undoubted authority here, says, in his *Rural Economy of Yorkshire*, at the commencement of the eighteenth century, the ancient black cattle were the only breed in this district. They resembled the present breed of the lowlands of Scotland, mostly horned, but some of them *humbled*. To these succeeded the long-horned or Craven breed, and which by degrees, spread over the whole of the northern and midland counties. At that time the chief work of the farm was done by cattle; the horse had not yet quite superseded the slower, but perhaps more profitable, ox; and many of the long-horns, until they began to be improved by the breeders in the midland counties, were deficient in several valuable points, while the use of them was exceedingly inconvenient, and sometimes dangerous, in the yoke.

On these accounts, the long-horns in turn gave way to the Holderness, or short-horn breed, and

that, for a century past, has maintained its ground, and will continue to do so.

Mr. Marshall gives a singular account of these cattle, when first introduced. He says, that "the Holderness breed were thin quartered, too light behind, and too coarse before; large shoulders, coarse necks, and dewlaps. This form being found disadvantageous to the butcher, increasing the quantity of the coarser parts, and reducing the weight of the prime pieces, the breeder endeavored to enlarge the hind quarters; and had he stopped when he had got to the happy medium, he would have wrought a good work; but the fashion was set—cloddy buttocks were in estimation. The first variety of this species of cattle, which I can recollect, was a thick, large-boned, coarse, clumsy animal, remarkably large behind, with thick gummy thighs; always fleshy, but never fat, and the flesh being of a bad quality. This, however, was not the worst: the monstrous size of the buttocks of the calf was frequently fatal to the cow, and numbers of cows were annually lost in calving. These monsters were stigmatized by the epithet 'Dutch buttocked,' and they were probably the worst breed the Vale ever knew."

This evil, however, soon cured itself; and, by judicious crossings from their own stock, and, soon afterwards, from the stock of the enterprising and skilful breeders on the banks of the Tees, the Yorkshire cow was brought to her present state of perfection, retaining, with little diminution, the milking properties of the Holderness, and the grazing ones of the improved short-horn. The old and comparatively unimproved breed is still indeed found in the possession of most of the dairy farmers of this part of the country, for the prejudice—and, as we have confessed, not an unfounded one—against the improved short-horns, that their milking properties have been sacrificed to the accumulation of fat, still widely prevails. Experience, however, gradually established the fact, that it is prudent to sacrifice a *small* portion of the milk to assist in feeding, when too old to continue in the dairy; or when, as in the neighborhood of large towns, her service as a dairy-cow are dispensed with at an early age. This cross being judiciously managed, the diminution of milk is so small, and the tendency to fatten so great, that the opinion of Mr. Sale (as quoted by Mr. Sneldon Cradock, of Hartforth, and to whom we return our thanks for some valuable information) is perfectly correct—I have always found, in my stock, that the best milkers, when dried for feeding, make the most fat in the least time." This is a doctrine which will be better understood and universally acknowledged by and by. Too many of the improvers of the short-horns have done but half justice to their excellent stock. He would deserve well of his country who, with skill and means sufficient, would devote himself to the illustration of this point.

It has been observed, that the cattle of this district have not improved of late so rapidly as in former times. There may be two reasons for this, viz., that the system of breeding *in-and-in* has been pursued somewhat too far, and that the depreciation of the times has withdrawn many landed proprietors from agricultural pursuits, and thus lessened that competition which was the most powerful stimulus to exertion.

The average weight of cattle in this riding of Yorkshire varies with the food and age of the animal. A steer from two and a half to three years old, when fit for the market, will usually weigh from sixty-five to seventy-five stones, imperial weight, and a heifer from fifty-five to sixty-five stones. The usual method of preparing them for the market is simple enough. The calf gets milk for the first two or three weeks, and after that, scalded skimmed milk, mixed with oil-cake boiled in water, with hay and turnips, until the spring pastures have sufficient produce to support him; he remains in them until the following winter, when he is either tied up, or turned loose into folds, and fed with straw and turnips until the ensuing May: he is then turned once more into the pasture until winter, when he is brought into the fold-yard as before, until nearly May day; and now, approaching to a state nearly fat enough for the butcher, three or four months grass-feeding generally completes him. Both the improved and the unimproved cattle are treated in the same way. Now, however, appears the essential difference between the breeds; the most forward of the unimproved are scarcely ready, when the improved cattle are gone, and they are never so fat and pointy as the others.

Upon the clay soil of Cleveland, and other parts of this district, the grass land is principally appropriated to the purpose of the dairy. There the unimproved breed mostly prevails; but even there, the most intelligent of the farmers begin to see the propriety of a cross or two from the Teeswater blood. The young cattle are principally sold in the neighboring markets, and are forwarded to the possessors of extensive turnip farms in Leicestershire and Northamptonshire.

A great proportion of the cows for the supply of the metropolitan dairies come from the North Riding of Yorkshire. They are sent away within a month or six weeks after calving; and either journey directly to London, or halt for a year or two in Bedfordshire, or some of the midland counties, in order that they may not reach their ultimate destination until they are five or six years old.

Among the breeders of the pure short-horns, in this Riding, Major Bower, of Welham, deserves honorable mention. His name appears among the purchasers at Mr. Charles Colling's sale. His cow Daisy, bought there, produced some excellent stock. A heifer of his breed, slaughtered at the age of eighteen months, weighed sixty-four stones, imperial weight, and ten stones of tallow.

The Earl of Carlisle formerly endeavored to improve the breed of this district by crossing with the Devonshire, and Mr. Cleaver with Sussex cattle, and it was said that more kindly feeders were obtained; the size was reduced a little, the leg shortened, the bone rendered finer, the form improved, and the strength of the short-horn remained for draught with the activity of the Devon. Whatever might have been the case with the first cross, this supposed improved race has passed quite away.

A cross between the short-horn bull and the Argyleshire heifer was attempted, with great prospect of success. Mr. Bates had obtained some excellent cattle from a similar attempt, but they could not be fed to an equal weight in the same time, and they were deficient in early maturity.

West Riding.—This is principally a manufacturing district, and there are comparatively few agriculturists who pay much attention to the im-

provement of the breed of cattle. The short-horns, either the Holderness, or with some crosses of the Durham, are chiefly found in the neighborhood of large towns. More in the country, and where the farms are small, (as they are through a great part of this Riding), there are a variety of crosses with the long-horns, and with nondescripts of former days. They go under the characteristic name of *half-horns*; the country people are fond of them, they are hardy, yield plenty of milk, and fatten with tolerable quickness. One would wonder how they retain one good quality, for Mr. Sorby, of Holylandhall, very characteristically describes them, and the little farmers of almost every district—"Those who have a cow or two, of some favorite kind, send them to the nearest bull, which does well enough, provided he gets them a calf. We must confess, that we never saw so great a collection of mongrels as in the manufacturing portion of the West Riding.

Mr. Newman, the agent of Lord Fitzwilliam, satisfactorily accounts for this. He thus writes to us. "The breed of cattle in the greatest esteem in the vicinity of Wentworth, and in fact throughout all the southern part of the West Riding of Yorkshire, is the pure short-horn. A traveller, however, passing through this district, will observe many deviations from that breed, and will meet with crosses that he will have much difficulty to identify. The farms are small, and the farmer has a kind of mixed employment, partly agricultural and partly mercantile: hence his attention is not so much directed to his farm as it should be, and hence arises a certain degree of carelessness as to the selection of his cattle; added to this, there is an idea, although an erroneous one, that the pure short-horns are not good milkers, and which tends materially to check the breed.

In the districts near Doncaster, where the population is more strictly agricultural, the short-horns prevail, and those of a breed and quality highly creditable both to the mere tenant farmer and to the gentleman who farms his own estate.

It is due to the memory of the late Mr. Mitton, of Badsworth, to place him at the very head of the improvers of short-horn cattle in this district. His "Old Bull," known in the Herd Book by the name of "Badsworth," is still in the recollection of the farmers of that neighborhood, and no animal contributed more to the improvement of the cattle for many miles round.

About the year 1805 the Wortley Farmer's Club was established, chiefly by Lord Wortley (then Mr. Stuart Wortley); and by the operations of that society very considerable improvement was effected in the breed of cattle, sheep, and pigs, round Wortley. In 1818, this society ceased to exist, for one more effective had been formed at Doncaster, under the patronage of Earl Fitzwilliam, Lord Althrop, Sir A. Cooke, and Mr. Fullerton of Thrybergh Park, and other neighboring gentlemen. This society still flourishes, and a very fair number of excellent cattle are annually exhibited, the males of which become dispersed through a wide district of country. The short-horn cattle have born away all the prizes.

In almost every part of the West Riding, many Scotch cattle are fed for one year or two, and then sold to the butcher to be slaughtered for home consumption.

As we advance towards the moorlands of the west and north-west of the district, the half-horns prevail more; and in Craven, the native country of the long horns, we find both the large and the small variety of this breed in tolerable perfection, but perhaps not so much so as in the north of Lancashire. Even here, the short-horns have penetrated and are increasing.

East Riding.—The short-horns prevail universally through this riding, except among the cottagers and little farmers, who still obstinately cling to some of the different varieties of half-horns. It is decidedly a breeding country, and a great number of cows are yearly sent from it to Lincolnshire, to be prepared for the London dairies; yet many oxen and cows are brought from the Wolds to the fortnightly and weekly markets so frequent in Yorkshire, and pastured on the rich ground with which the riding abounds.

Lincolnshire.—Mr. Berry has disposed of the Lincolnshire cattle in a very summary way, and we apprehend that no appeal can be made against his decision. "There is a large coarse short-horn prevailing, particularly in Lincolnshire, denomination in the quotations of the Smithfield markets 'Lincolns;' but they have no further affinity with the improved short-horns than as the latter have been referred to for their improvement, which has been accomplished to a considerable degree." As, however, we have to travel through each of the counties of Great Britain, we must enter a little more into the consideration of the character and claims of the Lincoln cattle.

Many of the present unimproved Lincolns may be regarded as fair specimens of the best of the old Dutch cattle. So prevalent is the opinion that this was the origin of the breed, that the metropolitan butcher denominates them Dutch cattle, and knows them much better by that name than as Lincolns. There is a coarseness about the head and horn which we have not seen either in the common Holderness or the improved Durham; the bone is comparatively large, the leg high, and the hips and loins wide, approaching to raggedness. Mr. Lawrence has a very appropriate remark respecting them, that they demand that Bakewellian improvement which their sheep have received.

There have been some zealous, and, to a considerable degree, successful improvers of this breed. At the head of them stands Captain Turnhill, of Reesby on the Wolds. With what materials he went to work is not certainly known; but it is supposed that he confined himself to a selection from the native breed; and certainly he produced a valuable animal, thinner in the horn, cleaner in the bone, lighter in the dewlap, shorter in the leg, full in the bosom, and round in the carcass. The breed was properly called "Turnhill's," and they yet remain in the hands of many farmers. They are handsome looking beasts, always full of lean flesh; with far greater disposition than before to put some fat on that flesh, and become sooner ripe for the market.

Others with somewhat more judgment, called in the aid of the Durhams, and more spedily and effectually completed their object. They took away the disposition to make lean beef only, although in very great quantities; and if they could not perfectly give to the Lincolns their own early maturity, they materially quickened the process of fattening. An improved Lincolnshire beast is

therefore now a very valuable animal; and if a finer grain could be given to the meat, the great quantity of muscle, compared with that of fat, would be no disadvantage.

After leaving the land, or the cow, the young cattle are kept during the first winter on hay, hay and turnips, or sometimes hay and a little oil cake. In the next summer they run on seeds or second rate land, and too often get nothing but straw in the winter. At two years old they fare no better, except that some now give from two to four pounds of oil cake daily; and they are sold, in the spring or summer, by those who have not the means to feed them, to jobbers, who dispose of them to the grazier. He winters them better if he buys them at the latter end of summer, and feeds them off before another winter; but if they are brought in the spring they are generally fed off before winter, many of them being put up for stall feeding, to which no breed is better adapted."

The Lincolnshire cattle are principally red and white, but a dun variety was introduced, about the middle of the last century, by Sir Charles Buck, of Hanby Grange, and which have so much improved in size, as almost to overtake the common breed of the county. They are found principally in the neighborhood of Folkingham, and have been fed up to one hundred and sixteen stones at seven years old.

The extraordinary animal which was exhibited under the name of "the Lincolnshire ox," although bred in that county, was an improved short-horn; and many of these are establishing themselves in every part of Lincolnshire.

Here, as in most other districts, there are great varieties of breeds, and which are said to be increasing, and even interfering with the purity of the native one, by means of the great annual importations of Irish cattle.

Some have purposely and very recently endeavored to establish a cross between the best of the long-horned Irish and the short-horns of the county: but the attempt, although promising some success at first, has decidedly failed.

Among the small farmers, half-horns of every size and variety are found, and they are crossed in every way that caprice or folly can suggest, yet they are most of them good milkers. The Lincolns, although better adapted for grazing than for the dairy, yield more milk, and of a richer quality, than some of the advocates for the old order of things are willing to allow.

Essex.—There is no distinguishing breed in this country; but the chief agricultural business, so far as cattle are concerned consists in the suckling of calves and grazing in the marshes, with some attention to the dairy in particular districts.

Our friend, Mr. May, veterinary surgeon at Maldon, informs us, that the suckling farmers procure their calves at the principal markets, viz., Romford, Chelmsford, Maldon, Braintree, and Colchester. The Romford market is chiefly supplied from London; Chelmsford and Maldon from London and Suffolk; and Colchester and Braintree chiefly from the Suffolk dairies.

They are brought in at from a week to a fortnight old, and are generally fed about twelve or fourteen weeks, when they are either brought by the butchers in the neighborhood, who kill and dress them, and send them to the London market or they are sent alive to the Romford and Smithfield markets, where they are purchased by the London butchers.

Many of these calves used to be reared in the rich pastures of Essex, and particularly the heifer calves from the metropolitan dairies; and many a cow went from Essex to keep up those establishments; but this practice is now almost totally discontinued.

The marshes afford excellent grazing for cattle that are not affected by the brackishness of the water, and there are few who suffer materially by this. When cattle are not perfectly ready for the market, a few weeks's grazing on the marshes will bring them rapidly forward. Some are purchased in store condition, in order that they may run three or four months on this luxurant pasture, and at the expiration of the time they are ready for Smithfield. At some periods of the year these flats are covered with cattle, chiefly of a small kind, and mostly the Welsh and Scotch runts; indeed the grazing is principally confined to these small cattle. A few farmers, however, in every part of Essex apply themselves to the regular grazing of cattle of a larger size. A few have the Devons, among whom must be reckoned Lord Western, who is partial to these cattle, both to feed and for the dairy. When they are grass fed, there are always some Scotch or Welsh runts as *trimmers*, i. e. to eat down what the larger and more valuable cattle leave. Many Herefords are prepared for the London market in the same manner.

The dairy business is confined to a comparatively small part of the county. A considerable quantity of butter is made in the neighborhood of Epping, and sent to the metropolis in small rolls; and it is deservedly celebrated for the peculiar sweetness of its taste. This depends not on the kind of cow, for occasionally a dairy contains half a dozen different breeds of cows, although the short-horns are the most prevalent; but because they feed during the summer in the shrubby pastures of Epping Forest, and the leaves of the trees, and of numerous wild and aromatic plants which there abound, impart to it its peculiar sweet flavor. The consumer, however, can seldom be certain that he has the real Epping butter, for a very fair imitation of it is sent up from Northamptonshire; and the London retail dealers wash the salt well out of the Cambridge butter, and, forming it into rolls, sell it for Epping butter, while a few are more impudent, and sell almost any kind of butter as true Epping.

PRUNING.

From the Genesee Farmer.

A great variety of experiments made in Europe, and by Buel, Kenrick, and others, have been made on the subject of pruning trees, and though the results did not perfectly agree on all points, yet they seem to fully justify the general conclusion that the best time for pruning trees is that period in midsummer in which there appears a cessation of the sap's ascent, and which lasts some three or four weeks. Those who had paid attention to the growth of trees must have remarked that the period of increase is divided in two seasons, during the first of which, or the one most active, the shoots that form fruit, flower, or seed-buds are

formed; and the other or later summer's growth is confined to the shoots that produce wood buds only. "After the second growth is completed the effects of the decending sap, in the formation of new bark, is apparent in the healing up of new wounds, in parts of the stem or branches, which now proceeds with more activity than during any other season of the year. Branches pruned off smooth at the stem, though the latter be young, healthy, and containing a perfect pith, before or shortly after the completion of the midsummer's growth, do not produce shoots from the edge of the wounds caused by their removal, which always happens more or less when pruning is performed on free growing trees after the fall of the leaf, and before the full development of the spring shoots and leaves. It is to be observed however that the reproduction of branches from the edge of a wound is greatly assisted by leaving a portion of the branch or shoot, on the parent branch or stem." [Treatise on Planting.]

The end desired to be attained by the operation of pruning must be kept steadily in view, or injury instead of benefit may be the result. If the tree is intended for timber, the leaves and buds that elaborate the sap, and increase the trunk by the formation of an annual circle of new wood, should be kept as far from the root as possible, as in this way only can the greatest quantity of timber be produced. In this case, the trunk should be kept free from branches, the leading shoot should carefully be preserved, and the top kept in a crown like form. Nature must be followed in this respect, and the tall beautiful trunks of our native forest trees will be the result. For fruit, a low branching top, spread and exposed to the sun as widely as can be, is to be preferred; and hence the leading shoot when the tree is at a proper height must be carefully cut out, and the lateral branches cut and pruned with direct reference to this effect. Fruit trees must be pruned frequently, or their tops become woody, close, and the fruit will necessarily prove inferior.

NEW MODE OF BREAKING OXEN.

From the Franklin Farmer.

"The onlyest way to break oxen that I ever saw!"—so exclaimed a countryman the other day, on seeing the operation. Get a strong post, eight feet long by two thick, plant it three and a half in the ground, (well rammed,) round or bevel the upper end, and leave a pin to it or make a mortise and put a strong two-inch pin, six or eight inches long in it. Then get a tough sapling twenty-five feet long; measure off at the small end the usual length of a yoke, and bore the holes for your bows accordingly. Then bore three holes (or more if you choose) four, eight and twelve feet from the other end, of the size of the pin in the top of the post, place it on top of the post, giving the shortest lever first, draw your steers up, let them be young or old, gentle or wild, it makes no difference; yoke them to the end of the pole, but instead of tying their tails together, if you wish to avoid bob-tailed oxen, tie their loins together with a good rope, wrap up their head halters, clear the front, and let them go. Round and round they go with a rush; drunk, drunker still they grow, until, groaning down they drop. For a while they lie panting and looking wild; at length they leap up as if suddenly frightened, rush round again, grow drunk and drop again. Leave them, they will repeat the experiment, until, reeling, they will stop or stand; in a few hours you may lead them around by their halters. Uncouple them from the pole or yoke them to your cart, and drive them where you choose with safety. Any gentleman will be entiled to the above patent for life by paying five dollars to the nearest needy widow, taking her receipt for the same and filing it among his own papers.

WM. P. HART.

HUSBANDRY IN CHINA.

Extract from Duhalde.

Among several good regulations made by the same emperor, [Yong. Ching,] he has shewn an uncommon regard for the husbandmen. To encourage them in their labor, he has ordered the governors of all the cities to send him notice every year, of the person of this profession, in their respective districts, who is most remarkable for his application to agriculture; for unblemished reputation; for preserving union in his own family, and peace with his neighbors; for his frugality and aversion to extravagance. Upon the report of the governor, the emperor will advance this wise and diligent husbandman to the degree of a mandarin of the eigth order, and send him patents of an ordinary mandarin; which distinction will entitle him to wear the habit of a mandarin, to visit the governor of the city, to sit in his presence, and drink tea with him. He will be respected all the rest of his days. After his death he will have funeral obsequies suitable to his degree; and his title of honor shall be written in the hall of his ancestors. What emulation must such a reward excite among the husbandmen!

Accordingly we find that they are continually busied about their lands; if they have any time to spare, they go immediately to the mountains to cut wood; to the garden to look to their herbs, or to cut canes, &c. so that they are never idle. The land in China never lies fallow. Generally the same ground produces three crops in a year; first rice; and before it is reaped they sow fitches; and when they are in head, beans or some other grain: thus it goes continually round. They very seldom employ their land for unprofitable uses, such as flower gardens, or fine walks; believing useful things more for the public good, and their own.

The attention of husbandmen, is chiefly employed in the cultivation of rice. They manure their land extremely well; gathering for that purpose, with extraordinary care, all sorts of ordure, both of men and animals, or truck for it wood, herbs, or linseed oil. This kind of manure, which elsewhere would burn up the plants, is very proper for the lands of China; where they have an art of tempering it with water before they use it. They gather the dung in pails, which they commonly carry covered on their shoulders; and this contributes very much to the cleanness of their cities, whose filth is thus taken away every day.

In the province of *Che-Kyang*, and other places, where they sow rice, they use balls of hogs, or even human hair; which, according to them, gives strength to the land, and makes that grain

grow better. For this reason, barbers save the hair which they cut off the heads, and sell for about a halfpenny a pound to such people who carry it away in bags; and you may often see barks loaded with it. When the plant begins to ear, if the land be watered with spring-water, they mix quick-lime with it; saying that it kills worms and insects, destroys weeds, and gives a warmth to the ground, which contributes much to its fertility. By this means the rice fields are so clean, that Navarette, sometimes, walked through them, looking for some small herb; and could never find any; so that he concludes, the rice which is surprisingly tall and fine, draws all the nourishment from the ground.

The husbandman sow their grain at first, without any order; but when it has shot about a foot, or a foot and an half high, they pluck it up by the roots; and making it into a sort of small sheaves, plant it by a line, and checkerwise; to the end, that ears, resting upon each other, may stand more firmly, and resist the winds. But, before the rice is transplanted, they level the land, and make it very smooth, after the following manner; having ploughed the ground three or four times successively, always to the ancles in water, they break the clods with the head of their mattocks; then, by the help of a wooden machine (on which a man stands upright, and guides the buffalo that draws it) they smooth the earth, that the water may be every where of an equal height; insomuch that the plains seem more like vast gardens than open fields.

The mountains in China are all cultivated; but one sees neither hedges nor ditches, nor scarce any tree; so fearful they are of losing an inch of of ground. It is very agreable to behold, in some places, plains three or four leagues in length, surrounded with hills and mountains, cut, from bottom to top, into terraces three or four feet high, and rising one above another, sometimes to the number of twenty or thirty. These mountains are not generally rocky, as those in Europe, the soil being light and porous, and so easy to be cut in several provinces, that one may dig three or four hundred feet without meeting with the rock. When the mountains are rocky, the Chinese loosen the stones, and make little walls of them to support the terraces, they then level the good soil and sow it with grain.

They are still more industrious. Though in some provinces, there are barren and uncultivated mountains, yet the valleys and fields which separate them in a vast number of places, are very fruitful and well cultivated. The husbandman first levels all the unequal places that are capable of culture. He then divides that part of the land, which is on the same level, into plots; and that along the edges of the vallies, which is unequal, into stories, in form of an amphitheatre: and as the rice will not thrive without water, they make reservoirs, at proper distances, and different heights, to catch the rain and the water which descends from the mountains, in order to distribute it equally among their rice-plots; either by letting it run down from the reservoir to the plots below, or causing it to ascend from the lower reservoir to the highest stories.

For this purpose they make use of certain hydraulic engines, which are very simple, both as to their make, and the manner of playing them. It is composed of a chain made of wood resembling a chaplet or pair of beads, strong as it were with a great number of flat boards, six or seven inches square, and placed parallel at equal distances. This chain passes through a square tube or gutter; at the lower end whereof is a smooth cylinder or barrel, whose axis is fixed in the two sides: and to the upper end is fastened a sort of drum, set round with little boards to answer those of the chain, which passes round both it and the cylinder: so that when the drum is turned, the chain turns also; and, consequently, the lower end of the gutter or tube being put into the water, and the drum-end set to the height where the water is to be conveyed, the boards filling exactly the cavity of the tube, must carry up a continual stream so long as the machine is in motion; which is performed in three ways,—1st. With the hand by means of one or two handles applied to the ends of the axis of the drum.—2nd. With the feet by means of certain large wooden pegs, about half a foot long, set round the axle-tree of the drum for that purpose. These pegs have great longish heads, rounded on the outside, for applying the soles of the naked feet; so that one or more men, may with the greatest ease put the engine in motion, either standing or sitting; their hands being employed all the while, the one holding an umbrella, and the other a fan.—3rd. By the assistance of a buffalo, or some other animal made fast to a great wheel, about four yards in diameter, placed horizontally. Round its circumference are fixed a great number of pegs or teeth; which tallying exactly with those in the axle-tree of the drum, turn the machine with a great deal of ease.

When a canal is to be cleansed, which often happens,—it is divided, at convenient distances, by dikes; and every neighboring village, being allotted its share, the peasants immediately appear with their chain-engines, whereby the water is conveyed from one to the other: this labor, though painful, is soon ended, by means of the multitudes of hands. In some parts, as the province of *Fo-Kyen*, the mountains, though not very high, are contiguous, and with scarce any valleys between; yet they are all cultivated by the art which the husbandman have to convey the water from one to the other through pipes made of bamboo.

To this surprising industry of the husbandmen, is owing that great plenty of grain and herbs, that reigns in China above all other regions. Notwithstanding which, the land hardly suffices to support its inhabitants; and one may venture to say, that to live comfortably they have need of a country as large again.

After all, the husbandmen are generally poor people, and have but a small parcel of land each. The usual rule is for the landlord to have one half the crop, and pay all taxes; the husbandman has the other half for his pains.

GRUB WORM.

From the Farmers' Cabinet.

A procrastinating farmer saves the lives of millions of grubs.

It seems to be a law of nature, that population should keep pace with the means of subsistence; and this law appears to be faithfully maintained

throughout the animal kingdom, even down to the lowest grade of insects and worms. The grub worm, which is so destructive to Indian corn in the early stages of its growth, was much less numerous and injurious previous to the introduction of red clover. At that period, corn was generally planted where there had not been a sufficient quantity of tender, succulent food, for it to subsist upon in any considerable numbers, and consequently its propagation and support was so slow as not to be observable. But when clover was generally cultivated, and by the most skilful arrangement of the rotation of crops, Indian corn succeeded it when the clover began to run out, the increase of the grub worm keeping pace with the means of subsistance, (for it feeds with avidity on the green, succulent stalks of clover,) propagated to a most alarming extent; and the sod being ploughed down in the spring for corn, and the pasture of the worms being by that means destroyed when the young corn began to vegetate and show itself above ground, the worms following out the law of self-preservation, and from no mischievous propensity, commenced feeding upon it more ravenously, and for some years it was almos doubted whether its culture would not have to be abandoned in some neighborhoods.

During this state of suspense, some observing, reflecting person, who no doubt had taken the trouble to examine into the character, habits and instincts of the grub, discovered that early in autumn it sought retreat some inches below the surface of the earth, and there prepared itself a domicil where it might repose in safety from storms and tempests till the vernal season arrived, and with it its accustomed food.

It was very rationally suggested, that if the sod was ploughed down late in the fall, and the habitations of the enemy turned topsy-turvey, that the walls might be broken in pieces by the winter frost, and that the inhabitants being turned out of doors would perish, and the young corn be preserved from its greatest enemy. This was at first suggested as a *theory*; it was soon put to the test of *practice;* and every farmer knows the benefit that resulted from it. The grub soon became a much less formidable enemy; every one knew how to vanquish it, provided a pretty severe winter came to his aid. But farmers sometimes have treacherous memories as well as other folks, and the enemy having been supposed to have been completely routed, there was a strong propensity felt to resume old habits, and postpone ploughing corn ground till spring again, in accordance with ancient custom; this has often been done, and generally with the same result; the enemy not being entirely exterminated, increases his forces, and proceeds again to the work of destruction.

A few years since, from winter setting in early, or some other cause, very little corn ground was ploughed in the autumn; the following spring the corn suffered severely from the depredations of the grub; but where portions of a field had been turned down in the fall, it furnished the usual protection; this was observable in numerous instances. The succeeding autumn, many farmers having a very short allowance of corn, and smarting under the infliction, went to turning up the ground in good earnest, and overturned the quarters of the enemy without compunction. The consequence was a general exemption from injury; it was pretty well followed out for a year or two afterwards; but last fall many began to relax, and to forget the things that they had suffered, and much corn ground was permitted to remain undisturbed till this spring, and those thus circumstanced are now going on in the old track, that did very well before clover was brought into general cultivation and the sod ploughed down for corn.

Now let us observe and see if the laws of nature have been reversed to accommodate those who neglect fall ploughing.

EGGS.

From the Genesco Farmer.

Almost every body loves good fresh eggs, and with or without glasses or silver spoons, can contrive to eat them; whether boiled or fried, raw or roasted, made into custard with sugar and spices, or swallowed gently with a bordering of old Port, they agree with the palate and stomach; and neatly laid out with fat slices of bacon, they form a repast within the reach of all, and to be despised by none. But though most farmers keep fowls, and *raise* their own eggs, there are many who have not yet learned the difference there is in the richness and flavor of eggs produced by fat and well fed hens, and those from birds that have been half starved through our winters. There will be some difference in the size, but far more in the quality. The yolk of one will be large, fine colored, and of good consistence, and the albumen or white, clear and pure; while the contents of the other will be watery and meager, as though there was not vitality or substance enough in the parent fowl to properly carry out and complete the work that nature had sketched. In order to have good eggs, the hens should be well fed, and also provided during the months they are unable to come at the ground, with a box of earth containing abundance of fine gravel, (if of limestone, so much the better,) that they may be able to grind and prepare for digestion the food they receive. Fowls form no small item in the profits of the small farmer, and few creatures better repay the care and attention they receive. Of eggs, those of the domestic hen are decidedly the best; but those of both ducks and geese may be used for some of the purposes of domestic cookery. Eggs can be kept any length of time, if the air is perfectly excluded, and the place of deposite kept at a low temperature.

FEEDING MILCH COWS.

From the Genesee Farmer.

Natural grass is the first and best of all food for cows; and where this can be obtained in sufficient quantities, nothing further can be desired. Sweet and nutritious, grass gives a richness and flavor to milk, attainable from no other source; and which, milk produced from grains, distiller's wash, or roots, can never equal. Of the grasses, lucerne is considered the best, and the clovers next; and as lucerne cannot with property be considered one of *our* cultivated grasses, perhaps we have nothing in this country that excels white clover for imparting a peculiar richness and even fragrance to milk;

The grasses are best for the cow, when fed green. But the best method of feeding the grass to the animal has been matter of some dispute. The common method of turning the cow into the field occasions the least trouble perhaps, but it is also the most wasteful; and where economy is to be consulted, some other method of feeding may be found preferable. Curwen found by experience that three acres of good grass, cut and fed to the cows, supplied 30 milch cows with 28 lbs. each, during 200 days. Their other food was hay, of which they consumed little, and their health was excellent, and their milk superior. Mr. Curwen observes, "that to have supplied a similar number of cows with a like quantity for the same period, would, in the usual way of management, have required 75 acres of land for its production. And to have grazed such a number of cows at liberty, that length of time, must, it is obvious, have taken a very considerable number of acres.

If such is the saving that may be made by substituting labor for land in feeding cows, we think the subject well worthy the attention of dairy-men, and milk-men, especially in the vicinity of our cities. If by employing the labor of one man through the summer months in carrying the grass to the cows, instead of allowing them to gather or trample it down for themselves, twenty cows could be kept on land that now supports only ten, we think there can be no question as to the profit. Only the best and sweetest grasses can be used for carrying; but where meadows of this kind exist, and by proper attention to draining, manuring, and seeding, all may be made such, the quantity of grass that may be taken from them by successive cuttings is great. Because in our meadows, the grass standing till nearly ripe before mowing, does not spring up at once, it by no means follows that when cut green, while the circulation is active and the roots vigorous, that such would not be the case. Indeed the rapidity with which the grasses spring up in our rich pastures after being fed down by cattle, is sufficient proof of what nature is able to accomplish, when the efforts are not checked, but aided by the skill of the husbandman.

ON THE PRESERVATION OF THE HEALTH OF NEGROES.

From the American Farmer.

It is a well known fact to physicians of the southern states, that "negroes, though less liable to autumnal diseases than the whites, yet suffer *much more* severely from winter epidemics than they do." The negroes, for instance, will escape the bilious affections of the hot season, while the white inhabitants are falling victims; but, when winter takes place, the blacks are swept off, while their masters' families are secured.

There would be, in the extraordinary nature of the fact, a sufficient incentive to the investigation of the cause or causes of this difference: but there are motives of a still more urgent nature, that demand an attempt at discovering the cause and preventing the effects. The blacks constitute, either absolutely or instrumentally, the wealth of our southern states. If a planter, as it often happens, is deprived by sickness of the labor of one third, or one half of his negroes, it becomes a loss of no small magnitude. If we should then succeed in ascertaining the cause, and pointing out a preventive, we shall not only have gratified curiosity, and served the interests of the planter, but also feel the approbation of our own mind in having aided the cause of humanity.

We have seen in our last number, "On Heat and Clothing," that *white* and *polished* surfaces let off heat *slowly;* whereas *black* or *rough* surfaces, radiate it *freely*. This is admitted as a fact in chemistry and physiology. We know that liquids cool soonest in *dark* vessels, and retain their heat longest in *bright* ones. We also know that animals in polar regions, which are of a *dark* color in the summer, change to *white* in the winter; nature, no doubt, intending by the change of color as much as by the thickening of their coat, to secure them against the severity of the cold. The negro on the other hand, was designed for the sultry regions of the torrid zone. His surface is therefore adapted to the ready escapement of internal heat. Hence, when transplanted to colder latitudes, he and his posterity are less capable of resisting external cold, because they are less capable of retaining their internal heat. It is also a fact well known to physiologists, that the body of a negro is, *cæteris paribus*, several degrees cooler than that of a white person. We known too, that blacks uniformly show themselves fonder of the fire than whites.

That they are then *really* more chilly, we cannot doubt, after taking into view all the circumstances just noticed. It therefore necessarily follows, that they are more liable to diseases brought on by the cold of winter, than white persons. They are likewise more subject to disease on account of their great exposure to wet and inclement weather.

In the enumeration of the causes of the greater liability of negroes to winter epidemics, we perceive an immediate answer to the question, "how can the health of slaves be best preserved?" We see that if they had a *white* skin, it would prove a security to them: but as we cannot "wash the Ethiop white," we must use such other means as may prevent the free escapement of their heat. They ought in the first place, to wear *woollens* next their skin, instead of linen and cotton. Long woollen shirts would retain their heat, equalize the excitement, and secure them against the effects of wet work and rainy weather. These shirts should be *white*, for reasons too obvious to need repetition. They should also be frequently washed, as clothing loses very much of its capacity for retaining heat, when filled with perspiration, &c. The truth of this we experience every time we change our soiled clothes for clean ones; for an increased and permanent glow of heat is the consequence of putting on clean clothes. When wet, negroes should dry by a good fire. They should also be allowed to sleep by a fire, if convenient: the *out* laborers especially.

By attending to this regimen, we feel no hesitation in saying that a planter will greatly secure the health of his slaves; and we shall conclude with remarking, that it now lies with him to determine, as soon as he may see proper, whether the trouble and expense of this preventive is rather to be chosen than the risk of losing much by the sickness or death of his negroes.

FRANKLIN.

DECLINE OF SOUTHERN COMMERCE.

From the Journal of Commerce.

The report of a committee of the Southern Convention, which was held last April, in Charleston, furnishes the following table, showing the comparative progress of commerce at the north and south :—

"The statistics of the United States enable us to present the following statements exhibiting at one view the rise, progress, and decay of southern commerce. They are extracted from one of the documents formerly published by this convention, and show that the time was, when the people of the south were the largest importers in the country.

"In 1769, the value of the imports of the several colonies was as follows :—

Of Virginia, - - - -	£851,140	sterling
New England states	561,000	do.
New York, - - -	189,000	do.
Pennsylvania, - -	400,000	do.
South Carolina, - -	555,000	do.

"The exports were in about the same proportion: Virginia exporting nearly four times as much as New York ; and South Carolina nearly twice as much as New York and Pennsylvania together ; and five times as much as all the New England states united.

"The same relative proportion of imports is preserved until the adoption of the federal constitution, when we find them to be in the year 1791 as follows:

"Of New York, - - - -	$3,222,000
Virginia, - - - -	2,486,000
South Carolina, - - -	1,520,000

"There are no data to show the imports into the several states from the year 1791 to 1820; but the general fact may be assumed, that the import trade of New York and other northern states has been constantly progressing, while that of Virginia and South Carolina has as regularly diminished. From 1821 to the present time, we have sufficient data, and they exhibit the following as the state of the import trade :

	New York.	*Virginia.*	*S. Carolina.*
1821	$23,000,000	$1,078,000	$3,000,000
1822	35,000,000	864,000	2,000,000
1823	29,000,000	681,000	2,000,000
1824	36,000,000	639,000	2,400,000
1825	49,000,000	553,000	2,150,000
1827	39,000,000	431,000	1,800,000
1829	43,000,000	375,000	1,240,000
1832	57,000,000	550,000	1,213,000

"Thus, the import trade of New York has gradually increased from £189,000 sterling, about $840,000, in the year 1769, and from about three millions of dollars in 1791, to the enormous sum in 1832, of fifty-seven millions of dollars! While Virginia has fallen off in her import trade, from two and a half millions of dollars, in 1791, to $375,000 in 1829, and $550,000 in 1832, not a great deal more than the freight of half a dozen ships!

"From these calculations, a few curious facts appear. The imports of New York were, in 1832, seventy times as great as they were in 1760, and nearly twenty times more than they were in 1791. Virginia, on the other hand, imported, in 1829, about one-eleventh of what she did in 1769, and about one-seventh of what she did in 1791. In a period, too, of eight years, the aggregate imports of New York amounted to three hundred and eleven millions of dollars ; those of South Carolina to about sixteen millions, and those of Virginia to about five millions! New York imported, therefore, in 1832, eleven times as much as Virginia did in eight years preceding, and nearly four times as much as South Carolina did in eight years preceding. Again, New York imported in one year (1832) nearly fifty times as much as South Carolina in the same year, and about 110 times as much as Virginia."

REMARKS ON THE VEGETABLE KINGDOM.

Delivered before the Cumberland Agricultural Society, April 12th, 1839.

By William B. Smith, M. D.

[Communicated for publication in the Farmers' Register.]

I propose making some general remarks on the vegetable kingdom, and will give an outline or synopsis of botany, stripped of its cabalistical covering. I shall do this in "simplicity and truth," endeavoring to comprise much in a short compass; and hope to be comprehensive without being considered technical.

First, I shall give a short history of plants; secondly, vegetable physiology ; thirdly, the analogy between plants and animals ; and fourthly, conclude with remarks on the fossil remains of vegetables.

The seeds.—The seeds of plants are of sexual origin, and in many respects correspond with the eggs of animals ; they are umbilically attached to the parent, and when ripe, drop in a dormant state, and, under favorable circumstances, remain for a length of time, uninjured. They contain a vital principle or embryo, and, when fully developed, are an exact likeness of the parent. Seeds have one or more coverings for the purpose of giving them form and preservation, until the time arrives for germination. They are wonderfully made, and contain more mystery than has been explained by the wisest philosopher that ever lived. An acorn is said to contain in its little shell, the rudiments of every member of the largest oak. If this opinion be correct, a germ is not a unit, but contains in its compass a plurality or multiplicity of its kind, with reproductive or procreative powers ; and may be considered multiparous, capable of bringing forth many at a birth. An acorn, therefore, contains the rudiments of many thousand young buds ; some of which require ages for their full developement. The oak attains the age of one thousand years ; during this period it is annually bringing into being young trees. Every bud is a distinct tree, and when evolved, will be like the parent. In a stalk of corn, each off-set may be considered a multiparous shoot, producing it's like; and, with a few exceptions, this is the case with regard to the whole vegetable race. We observe in seeds, a living principle, in a minute organic germ, capable of wonderful developement. When seeds are placed in the soil, having a due portion of heat and moisture, they swell, become soft and mucilaginous, are enlarged, and in a short time, burst asunder their membranes ; the little root is seen descending in the earth, in search of humid, gaseous, elemental

food; and becomes permanently fixed. Soon after this, the ascending sprout climbs upward, peeps out of darkness, and is brought into light and life; expanding and enlarging until there is a full developement of all its parts. The young germ or embryo, is in contact with one or more lobes of nutritive matter, yielding food for the infant plant, until its tender root is sufficiently large and strong, to go in search of aliment. This nutritive or farinaceous matter, is entirely absorbed by the plant, during the first period of its growth.

The form, size and color of seeds, are so various, that I shall not attempt to describe them; some are extremely small, others large, having a great variety of form, size and color. Many are found on the spot where they grew, and become food for man and other animals. Some are driven by currents of water in various directions; while others take wing, and fly from one situation to another. The great aerial ocean, that surrounds this earth, is filled with minute seeds, which are perhaps wafted from continent to continent; those that are heavy become saturated with water, return to the earth, and as soon as they find a matrix, spring into life, run their course and rot. If large trunks of mahogany, palm nuts, &c., are driven from the gulf of Mexico, by marine currents, to the coasts of Ireland and Norway, I see no cause to prevent the finer downy seeds from being wafted on the wings of the wind across the Atlantic Ocean. There is a singular circumstance in the history of seeds, viz., they are said to remain for ages, in a state of preservation; the different kinds of plants that occasionally visit us, favor such an opinion. In our forest plant beds, we frequently observe a new set of plants, differing in genera and species from those in the neighborhood; and I think it probable forest seeds lie dormant under the earth and leaves, retaining their vitality, and may be made to germinate by exposing them to the action of light and air. Seeds are said by botanists to be the essence of the fruit of vegetables. Linnæus denominates seeds to be the deciduous parts of the plants, containing the rudiments of new organization, fertilized by the male dust.

Plants are furnished with one seed, or with two, three, four, five, six or many: the fecundity of plants is often astonishing. A single plant of tobacco, is said to produce 500,000 seeds; and a single stalk of spleen-wort one million. If these two plants could multiply and beget their like unmolested and undiminished for twenty years, and every plant during that period retain its organization entire, so that there could be a full evolution and developement of every plant; a mass of tobacco and spleen-wort, in all probability, would be formed, equal in bulk to this earth. This may be considered a novel opinion; but wise philosophers have said that a single herring, if suffered to spawn and multiply, under favorable circumstances, would form a mass as large as this earth in fifteen years.

The root.—The root is the first part produced by a germinating embryo; and its presence is necessary to most plants. Some plants feed from the atmosphere. The dodder, or love vine, entwines various grasses and weeds, and would seem to exist without roots; it is, however, propagated from seeds deposited in the earth, and as soon as the plant begins to feed from the atmosphere, the communication between the earth and dodder is cut off, and the root dies. When the primitive root enters the soil, it gives off small fibres from the end and along its sides; these end and side roots give off branches in like manner, until by repeated division and sub-division they are all expanded and enlarged. They serve to fix and hold plants to the soil from which they imbibe nourishment through their porous and elementary tubes. A root is semi-annual, annual, biennial, and perennial. Semi-annual and annual plants live but one season, as many kinds of grass, oats, &c. Biennial roots survive one winter, as clover, wheat, rye, &c., and perish the following summer after perfecting their seeds. Perennial roots are such as remain and produce blossoms and seeds for many years. The body of a root is denominated the *cordex*, and the fibrous part the *radicular*. It is highly necessary that we should be well acquainted with the various kinds of roots, for they differ very widely in their nature and functions. Fibrous roots, particularly those near the surface, require a constant accession of moisture, while those of the more fleshy kind most powerfully resist drought, and are reservoirs of the vital energies of plants.

Roots are distinguished as follows: 1st, A fibrous roof, as in many kinds of grasses and grain. 2nd, A creeping root, as in weeds. 3rd, A spindle-shaped, or tap root, as in cotton, carrots, and radish. 4th, A stumped root, as in many kinds of plants. 5th, A tuberous root, or knobbed root, as in the potato. 6th, A bulbous root; this is a subterraneous bud, being solid, as in the crocus, ternicate, as in the onion, or scaly, as in the lily. 7th, A granulated root. 8th, The extended root, as in forest trees. There are some remarkable circumstances recorded respecting the longevity of roots. It is well authenticated that the roots of some trees, when grubbed up, were found fresh and sound, though the tree had been felled many years. The larger roots of plants, trees, &c., have a triple office to perform, viz., they act as supporters and feeders, and give off stems; whereas the smaller roots, are most actively employed in supporting the plant with nutritive matter. The ends of young roots are extremely soft, tender and delicate, and cannot bear the action of light and air; hence their downward direction at first, but as soon as they gain strength, they change this direction, and climb up near the surface in order to breathe. They travel a considerable distance in search of food; the Indian corn extends its roots to the distance of ten or twelve feet; and forest trees, such as the oak, poplar and pine, run out their roots to the distance of 75 yards. All roots are said to be choice in their selection of food, for they are known to creep aside and avoid bad earth, in order to approach good. Whoever has attended, in the slightest degree, to the developement of plants, must have observed that as soon as the little germ commences its course in life, it has two opposite directions; one perpendicularly upward, and the other immediately downward. There is a line of demarkation between the ascending and descending members which seems peculiarly organized. Whatever enlargement, division or sub-division, takes place in the first stage of life, below this line or point, are roots, which descend; and whatever is above, are shoots and sprouts, and rise into the air. This point

bears the seed leaves or *cotyledons*, and is the crown of the root, and base of the stem, called radical plate or life-knot, which is of the greatest importance in the economy of vegetables; for all the other members of the plant may be destroyed or separated without loss of life, if the radical plate, life-knot or collet, be preserved. If divided in many parts each will become perfect plants. It is a homogeneous substance, and has the property of giving off many individual plants, and is properly speaking an assemblage of vital buds, to be developed in the order of their position. The oldest central bud is the largest, and generally puts forth first, and the others follow in regular succession, which may with propriety be called off-sets. The life-knot or radical plate of a turnip is found on the top; that of an onion at the bottom. Planters and gardeners should be particular, and not place the life-knot or radical plate too far below the surface of the earth; if they do, atmospheric air is excluded, and the plant either dwindles or dies. In transplanting trees, the life-knot is often placed too deep; the consequence is, that the tree remains stationary for a length of time, and if the buds shoot, they are diseased, grow slowly, and the whole tree is imperfectly developed. In transplanting tobacco, cabbage, &c., we are apt to plant deep in order to secure moisture to the root; such plants live and are stationary for six weeks or two months, and the result is a small unhealthy crop. Some roots have buds in abundance, and produce stems; and we may say in truth, that both roots and stems contain buds.

The stem or trunk.—The stem or trunk, is that body which is above ground, and serves to support and elevate branches, leaves, fructification, and fruit. The stem assumes many forms and characters, as to bulk, structure, position, place and duration; varying in size, from the smallest thread, to a trunk of ten feet in diameter. The structure of stems are hollow or solid, jointed or simple, single or numerous. In position, they are erect, inclining, prostrate, &c.; they rise in the air, or creep on the surface, and are succulent or woody. The form of stems are various, being round, flat, angular, square, &c. Some have but few branches, as the reed, others give off many and divide until we observe almost a countless number from a single stock. The stem is composed of pith, wood, and bark; the pith generally occupies the centre of the stem, and constitutes the principal part of the bulk of the seedling, and of every young shoot: it is soft and spongy, and as it increases in size, diminishes in volume, and ultimately becomes ligneous matter: this is the case with woody trunks. The layers of wood are supposed to be formed from the pith, and the diameters of trunks are annually enlarged by concentric layers; the pith being in the centre of the ligneous circles. These annual circles of wood are composed of parallel fibres longitudinally arranged, extending from the root or life-knot, to the summit of the trunk, and throughout every branch of the spreading tree. The concentric layers or circles are distinct from each other, and are connected by inspissated sap, and cellular tissue. The ages of trees may be ascertained by counting the number of rings from the pith to the bark. After trees have passed their usual age, they begin to decay; the oldest and first formed circles, next the pith, decay, and so on until the tree becomes a hollow shell, and nothing remains but the sap-wood next the bark.

The bark.—The tender plant, rises from the earth with its exquisitely delicate coat of bark; which remains as an external covering, enlarging as the tree increases in size; some plants, however, shed their bark periodically. The inner bark is formed into white-wood, or sap-wood annually, and another coat of bark formed from inspissated sap. These new layers of bark and wood are the pr[illegible] channels for the circulation of sap. The warmth. In B[illegible] of trees corresponds pretty much with produce te[illegible]nimals, having an external, middle, and [illegible]; and it[illegible]or covering. Branches are subdivisions o[illegible]re 351) [illegible]k, and every bud they contain is a you[illegible]ced in t[illegible]aves of plants, are very important organs; [illegible]et it would seem, they are not absolutely [illegible]bary to all plants; as the stem and stalk in some few instances perform the office of leaves. They are decidedly organized, and so formed, as to present a large surface to the action of light and air. Next to the flowers, they are the grand ornaments of plants, and from their number and position must perform some very important office in the economy of vegetables. Leaves are supposed to be the organs of respiration, or in other words, they are the lungs of vegetables. They contribute to the growth of plants, having inhaling and exhaling vessels. Vegetables take in atmospheric air, and give out oxygen gas; the reverse takes place with respect to the animal kingdom. In animal respiration, oxygen gas is absorbed, and it would seem by this wise provision of nature, that a just balance is kept up between the two kingdoms. Leaves produce a constant flow of sap upwards, in consequence of their exhaling and inhaling functions; hence it is that plants die if robbed of leaves; their health and vigor depending pretty much on these important appendages. The inhaling leaf vessels not only take in atmospheric air, but they imbibe large quantities of water, and modern naturalists are decidedly of the opinion, that the hydraulic action of leaves are their chief office. Leaves have a great variety of form, and many appendages which I consider unimportant, except to the botanists, and will pass on the

Flower and fructification.—The parts of the flower are the *calyx*, *corolla*, *stamens*, *disk*, *nectarium*, *pistillum* and *receptacle*. The *calyx* is the external covering or investment of the flower; in which it sits, and serves to defend the more delicate members of the flower. The *coralla* is the beautiful brilliant assemblage of variegated and highly colored leaves, or petals, which stand immediately within the calyx. The *stamen* is the male part of the flower, situated in the corolla, and consists of three members; the *filament*, the *anther* on its summit, and the *pollen*, or dust discharged from the anther. The *pollen* is formed in the *anther*, by a process called secretion: it contains the fecundating influence or principle, without the contact of which seeds, already formed in the *ovarium*, would be abortive. This dust, when seen by a microscope, appears globular, oval, square, &c. The dispersion of the *pollen* is caused by the spontaneous action of the *anthers*, and facilitated by the visits of insects. The *stamen* is of short duration, and disappears soon after the *pollen* is discharged. The *disk* is at the base of

the stamen, connected with the seed vessel, and forms a vacant space. The *pistillum*, occupies the centre of the flower; it is the female or reproductive part of the plant; and like the *anther*, consists of three divisions; viz. the seed-vessel or *ovarium*, the *style* and the *stigma*. The *ovarium* is differently constructed, and assumes various shapes. The *style* is that portion of the *pistillum* which serves to elevate the *stigma*, and is usually seated on the topmost part of the *ovarium*, and is of various lengths; it is a cylindrical tube for the purpose of admitting the descent of the *pollen* shed from the *anthers*. Sometimes the *style* is wanting; when this is the case, the *stigma* is in contact with the *ovarium*. As soon as the *ovarium* becomes impregnated, the *style* dies; some plants have one *style*, some two or more. The *style* and *stigma*, are very delicate members of flowers, being easily injured by cold winds and frosts. The *stigma* is found on the summit of the *style*, if the latter be present; if not, on the apex or crown of the *ovarium*. It is the only part of the plant that has no cuticle, and, where perfect, is covered with a lymph to catch and dissolve the *pollen* shed from the *anthers*. In this delicate mucilage, the *pollen* undergoes some kind of change, or solution, preparatory to its descent into uterus. This seems to be the course in which the sexual powers of plants are united and consummated. The *receptacle* is that part on which all the members of flowers are seated, and may be called the flower stem.

We have traced the plant from the seed, through its various evolutions, and have given a short account of its members, organs and woody structure; which may with propriety be called the solid parts of vegetables. We propose now to make some remarks on the fluids and tissues of plants.

The various matters affording food for plants, are changed by the organization of the vegetable; from which their results a fluid generally distributed and known by the name of sap. This juice, when conveyed into the several parts of the plant, receives an infinity of modifications, and forms the several fluids which are separated and afforded by their various organs.

The fluids consist of aqueous and gaseous principles, extracted from the earth and atmosphere. These principles are taken up by the plant and elaborated into sap, mucilage, gum, glue, oil, resin, sugar and various acid and saline secretions. Plants have numerous vessels, for the purpose of transmitting these fluids; they are found pervading every part of the root, stem, branches, leaves, flowers, fructification and fruit: indeed these vessels, as numerous as they are in large trees, may be found in the young tender plant, and even in the embryo, long before germination. The circulation then commences with the seed, and continues through its evolution and growth, down to the closing period of life. The vessels common to plants, are inhaling and exhaling vessels, spiral tubes, and longitudinal ducts. Vessels are composed of circular fibres, so delicate and elastic, that they are capable of contraction and relaxation. This alternate contraction and relaxation of the circular fibres, together with capillary attraction and heat, causes the fluids of plants to circulate through their numerous vessels; which divide and sub-divide into an infinite number of branches and ramifications, until every part of the plant is supplied with fluid matter. The cellular tissue, or membrane, is found in every part of plants, binding their structure, giving them form, and may be considered a bond of union; tying not only every woody fibre to its fellow, but linking together there, in one solid mass, all their various parts. The cellular tissue, has innumerable minute cells, varying in form and size, slightly attached to each other; these cells attract and absorb moisture and gaseous matters, from the atmosphere and earth, and after elaborating the elemantary principles, they go the round of circulation, and are formed into sap, oil, mucilage, &c. The delicate pellicle or skin of the cells of this membranous tissue in the lower order of vegetation is mucilaginous; in the higher orders, they become ligneous, and constitute what is called wood or timber. As all plants are of rudimental origin, it is natural to conclude that the cellular membrane, vascular membrane, and woody membrane or tissues, are co-eval with plants, which "grow with their growth, and strengthen with their strength." These three elementary organs, viz: the cellular, vascular and woody tissues, when united, form a bond of union, and by their wonderful inosculations and ramifications, pervade the whole plant; giving to every part, its organic structure, form and comeliness.

Plants may be compared to animals; having their solid parts analogous to bones, cartilages, muscles and tendons: the fluids of the vegetable kingdom may be compared to the blood of animals; with this difference, that the latter is propelled through arteries, by the muscular power of the heart, and sap, we have reason to believe is pushed forward by the expansive power of heat and capillary attraction. Blood, after going the round of circulation, is returned by veins, except that part washed off, and arrested by a number of glands, a process called secretion. This we believe is pretty much the case with the sap of vegetables; for we know secreted fluids are formed from sap, and after supplying every part of the the plant with fluid matter, it returns and descends to the roots. The blood is formed from well digested food, this is the case with regard to sap; so that vegetables are analogous to animals, both kingdoms being dependent on the earth and atmosphere for subsistence. The highest link in the vegetable scale of existence, is perhaps but one remove from the lowest link in the animal kingdom. Vegetables, have roots for their digestive organs, trunks for their support, branches for their extremities, leaves for their lungs, bark for their skin, woody fibres for their bones, cartilages, muscles and tendons, spiral vessels and ducts for their arteries and veins, and sap for their blood. They have, also, male and female organs of generation, and fruit and seed as their offspring. The growth of vegetables depends on various decompositions which evolve a number of gasses that are absorbed by the plant, and elaborated into sap, mucilage, oil, &c. Like animals, they cannot live without food and drink; like animals, they feed upon air, water, animal and vegetable productions. The rapid or slow growth of vegetables, depend on rapid or slow decomposition; for nothing can exist except it be from something which had previously perished; composition and decomposition are continually taking place upon the earth, and without this provision in nature, the vegetable and animal kingdoms would, in a short time, become extinct.

(To be continued.)

THE "MAMMOTH" SILK-WORM EGGS; AND THE GROUNDS OF CHOICE AMONG DIFFERENT VARIETIES.

The "mammoth silk-worms" have recently been much puffed in newspaper paragraphs and advertisements; and these recommendations have been received by the continually humbugged agricultural public, with the degree of respect and confidence which is usually given to all who offer "mammoth" seeds or plants, or either vegetables or animals which, by greater size, and supposed prolific power, are *promised* to produce more profitable results than any known before. If the recommendations of the "mammoth silk-worms" eggs had been limited merely and truly to superior size, the subject would not have needed remark. But when they were offered for sale for the purpose of raising second crops of worms from, in the same season, and were actually engaged by many persons under this delusion, at $70 to $80 the ounce, it was time to try to save to some of our readers at least, the money which they might otherwise throw away in misdirected efforts in the important business of silk-culture. With this view, as well as in answer to special inquiries of correspondents, the following remarks, in substance, were prepared for the last sheet of the May number; but could not be inserted, for want of room at the closing.

In the first place we deny totally the main ground of the reputed value of the "mammoth" silk-worms eggs, which is, that they will hatch more than once in one season; and but for this opinion, certainly no one would have paid any thing like $80 the ounce for eggs of 1839. It will not be expected of us to prove a negative proposition; and if this assertion is denied by the advocates of the mammoth variety, it will be for them to exhibit proof that it is truly a "two-crop" kind. That, we confidently believe, cannot be done, and without it, the only remaining recommendation will be that of superior size, which will presently be examined.

We had before believed—and since have been assured by the testimony of L. Y. Atkins, esq. in a previous page—that the eggs of none of the ordinary kinds of worms could be relied on to hatch a second time in the same season; and that the only known kind which can be trusted to, is the small "two-crop white" variety of this country, and which, though a four-cast worm, seems in all other respects to be the same with the small worm of "three-casts" described and recommended by Dandolo. We, as well as Mr. Atkins, have known eggs of the common sized worms to hatch soon after being laid; but such hatching is not certain to occur at all, and never but to a very limited extent. Such *may be* the case with a like small proportion of the "mammoth" eggs—but even that has not been *warranted* in plain terms; and until it is proved to the contrary, we must consider that these stand on no better ground, for second hatchings, than the ordinary kinds.

The repetition of hatching which has become a fixed quality in the "two-crop white" silk-worm, and in other kinds known in tropical climates, is doubtless caused by the long continued action of warmth. In Bengal it is said that there are worms which produce ten or more successive generations in a year; and it seems from Dr. Perrine's information (page 351) that a similar result has already been produced in Cuba. The climate of Virginia is sufficient to make the common worms exhibit a tendency to become a two-crop kind; and we doubt not but such may be produced here, and the quality of repetition be made permanent, in a few years, by rearing from the few eggs which hatch in the same season they are laid. We are now conducting such an experiment with the eggs of a single moth, which alone have hatched out of the laying of 500 females.

We presume that the "mammoth" silk-worms are of the same kind, with some slight change, with the "large silk-worm of four casts" or moultings, described by Dandolo, and to which he objects on several sufficient grounds. Of this kind 150 cocoons weighed as much as 360 of the common kind. Of the "mammoth" cocoons made this season in Richmond, it took 190 to weigh a pound, and a pound of good common cocoons raised here, taken as they come, will count about 300, or perhaps 250, if the best be selected. But whether the mammoth worms and the large worms described by Dandolo are the same, or not, is not important; since the peculiarities, and advantages and disadvantages, of all large worms must be of the same general character. It will not be questioned but that all the larger varieties feed for a longer time, and spin coarser silk than the smaller; and these constitute the main objections urged by Dandolo. He states of the large kind, that their silk is less pure, (or loses more in manufacturing) than that of the common kind of worms, and coarser by nearly 20 per cent. Of course, it would command less price, even if not rejected by the manufacturers for its unusual coarseness. The worms also are several days longer feeding, (under like treatment,) and thus require more time, more labor and expense, and are at more risk. On these general and theoretical grounds alone, we should consider any unusually large kind of silk-worms as the least profitable that could be chosen for culture. But in addition, we have the confirmation, and still more extended objections of a practical experienced and judicious silk-culturist, which will be given below.

There is, however, one, and only one, claim of superiority, which can be truly made for the largest over the common sized varieties. This is, that the weight of food, necessarily consumed for producing the same weight of silk, is rather less for the former than the latter. The comparative quantities as stated by Dandolo, are 18¾ lbs. of leaves, consumed by the larger, and 20¾ by the smaller worms, to produce 1½ lbs. of cocoons. This small difference, if known by the advocates of the mammoth varieties, has been studiously kept by them out of sight—they contenting themselves with claiming large products, in general terms, without stating the amount. Dandolo seems to think that the difference of purity in the two kinds of silk, (or difference of waste in manufacturing,) is caused by, and is not more than compensated by this small saving of food—leaving the other objections out of the estimate.

We think that some of the ordinary kinds of worms, (or what are called the "six-weeks" kinds at the north, but which usually require only from 25 to 28 days' feeding in Virginia,) are the best for general and regular culture. Of these there are many varieties, or shades of difference, and we know not, from experience, which is best. But as our opinion on this point may be expected, when objecting to other varieties, however little the opinion may be worth, we will say, that, with our present imperfect lights, we should prefer the gray silk-worm, with cocoons generally orange; because its product is equal to any, except for the cocoon not being white, and because it seems uncommonly hardy, judging from the general success in rearing this spring, by many different persons, under every variety of exposure, and of injudicious and bad treatment. Judging from report, we should also consider the "pea-nut silk-worm" of the northern states as a valuable variety. But of this we have no practical experience, except in a very small rearing commenced (for comparative experiment) as late as the 18th inst.; and from this we have as yet only learned that the gray worms were larger than the pea-nut, by 50 per cent., at five days old. Hence we would infer that the latter is of size considerably below that of the usual kinds, and which would be as objectionable as being much larger than usual.

If the ordinary or "six-weeks" worms were neither better nor worse than the "mammoth," or any other longer or shorter-lived variety, there would still be a sufficient reason for preferring the former, in the fact that to this kind apply the precise and valuable descriptions and instructions of Dandolo. There is no kind of culture in which the best methods of practice, and the means for accommodation, have been so carefully studied, and elaborately and minutely laid down, by a judicious and rigid course of scientific and practical experiments, as has been done by Dandolo in regard to silk-culture; and the *statistics* of silk-worms which he has furnished—and which have been ascertained by him as an accurate philosophical experimentalist, as well as a very successful practical culturist—offer to the novice a body of information that cannot be too highly appreciated. The better climate of our country, and other superior advantages of the culturist in Virginia over those of France and Italy, may permit him to dispense with many of Dandolo's directions and precautions. Nevertheless, his descriptions of appearances, his facts, his estimates, and his arithmetical statements, are all valuable for reference, and for daily information and instruction. And all these apply to the varieties of silk-worms of ordinary size and duration of age, &c., and would be more or less inapplicable to all "mammoth" varieties. This objection also applies as much to smaller sized varieties; and we should thereupon reject even the "two-crop white" kind, but for the peculiar circumstances of this country at this time, which make it very desirable to secure a double reproduction of eggs, the more rapidly to supply the existing demand. Also, to guard against possible losses of eggs, or of hatchings of worms, it will be well for every culturist to have a portion of his stock of this, or some other two-crop kind.

The recent high appreciation of the "mammoth" silk-worm, is owing to the remarkable prevailing disposition in this country to believe that large-sized individual products are also more abundant in average or general products. Most persons scarcely need the proofs or persuasion of a salesman's advertisements or assertion, but, of themselves, readily jump to the conclusion, that a large sized variety of corn or of wheat, or many ears to the stalk, or of grains to the ear, will necessarily yield more bushels to the acre; and that large varieties of domestic animals will yield more meat for the food they consume. There *may be* a greater or less production from any larger or smaller variety, of vegetable or annual; but it will not depend upon mere difference of size in the individual, but upon its fitness or unfitness for its new position and treatment. But *merely* an increase of size to considerable extent, without greater general product in proportion to the cost of support, will always be disadvantageous; became the previous accommodations for, and means of operating with, the usual smaller sized products, will be less suitable to the larger. If there were offered for sale a breed of sheep as large as horses, and of cows as large as elephants, there would be no inducement to buy and propagate them, if no more wool, milk, or meat, would be obtained from them than the common smaller kinds, on the same amount of land or grass. Nor will the fanciers of large corn and wheat and other vegetable products gain any thing from varieties as enormous in size as their hopes can

reach, unless they can also secure a greater product in bushels from the acre, than from the common kinds. This greater general product, however, the humbugged public always expect to obtain, and always have been duped and disappointed in, when led to expect it from large sized varieties. So, as we infer, of the mammoth silk-worm; and even if it were true (as it is not)—that the silk is as good—and the culture as cheap, (which it is not,) still we cannot conceive a reason why it should be preferable to other kinds of common size. But if our reasoning should fail to convince the fanciers of mammoth cocoons, among our readers, (as we presume it will,) we have only to wish them all possible success in the pursuit they prefer; and that they may be able to find cocoons as large as oranges, and to buy the eggs at $10 the dozen, (which would of course insure the demand for them,) and also salesmen who will promise them every possible advantage and profit therefrom, that can be desired or conceived.

There is, however, a much more important ground for choice among silk-worms' eggs, than merely the *kind*—and that is the source whence they are procured, and the treatment and condition of the worms which produced them. It is of the utmost importance that the parent stock should have been healthy, to produce a healthy and vigorous progeny. In our very limited range of observation and practical information on this head, we have known or heard of worms of a particular parcel of eggs becoming diseased, and turning out very badly, when others of another stock did well, at the same time, or under the like management at a different time. The northern raised eggs hatched and fed near this place, this season, have in the general, brought worms manifestly less healthy and vigorous, than the southern. An intelligent and observant experimental feeder in another part of the country, from whom we have have just received a letter, has come to precisely the same conclusion. He say, that "from my own observations, and what I know from others, eggs raised in the south have a decided preference. The worms are much more healthy."

Further—the mixture, from carelessness, of the eggs of different kinds of worms, or of variously crossed varieties, even if every one separately were good enough, is enough to make the whole parcel worthless, and of more plague than profit to the buyer. Even when one variety is kept unadulterated by any mixture of another, it can only be kept uniform in character and qualities, by a careful selection of breeders and of eggs. If a race could be thus obtained of character uniform in all respects, that uniformity alone would make the stock more valuable than any now known.

COMPARATIVE WEIGHTS OF COCOONS OF DIFFERENT VARIETIES OF SILK-WORMS.

To the Editor of the Farmers' Register.

Stafford, June 15th, 1839.

I am highly gratified at the result of your first experiment in the culture of silk. I consider it very encouraging. My worms have also done very well. The cocoons were generally firm and weigh well.

My main object in writing you now, is to state some facts on the point on which you intend hereafter to give an opinion.

I am glad to find you have come to the same conclusion that I have (though I know not by what inducements,) relative to the comparative value of the large and small varieties of the silk-worm. I reared this season five varieties, viz., "two-crop," "pea-nut," "mammoth yellow," and two other varieties produced by cross fecundation, always using either the male or female of the "two-crop."

Two hundred and ninety-seven of the cocoons of the "mammoth yellow" taken without selection, weigh a pound; 326 of the "pea-nut;" 360 of the "two-crop;" and 400 of each of the varieties produced by cross fecundation. The floss was taken off previous to weighing. While the cocoons of the "mammoth yellow" are full 60 per cent. larger than those of the "two-crop" or of the "pea-nut," they have the advantage in weight in one case only 9 per cent., and in the other only 21 per cent. One thousand of the cocoons of the "mammoth yellow" furnish an ounce and a quarter of floss, while the same number of the "two-crop" give less than a half ounce. This is a point of some importance, and needs close examination. I procured the eggs of the "pea-nut" from T. S. Pleasants, and I am pleased with their cocoons, but further experiments are necessary to decide whether or not they are adapted to the climate of Virginia.

Respectfully yours,

LAYTON Y. ATKINS.

PROGRESS OF SILK CULTURE IN THE NEIGHBORHOOD OF PHILADELPHIA.

From Morris's Silk Farmer.

The remark is frequently made, by persons not engaged in this interesting business, that every body is raising trees, but few or none are raising silk. Such remarks can only proceed from ignorance of what is really the condition of the silk business among us; and while great pains have been taken to inflame the public mind respecting the multicaulis, none whatever, or comparatively very little, have been taken to diffuse information as to the progress of the culture of silk. Hence the remark above named being so general. But there are facts in existence strong enough to satisfy the public mind, if candidly stated, that the raising of silk is going on as rapidly as the nature of the business will admit, and as the most sanguine could possibly desire. These facts are well known to those interested in the business, and may be briefly stated. Ten cocooneries have been built (within the writer's own knowledge) within a year past, in the neighborhood of this city, some of them large enough to feed two mil-

lions of worms; and others are in contemplation. One establishment near Philadelpha raised near 700 ounces of eggs last season, which sold last fall at ten dollars per ounce; and the balance which remained on hand this spring sold readily at from twenty to twenty-five dollars per ounce, and the demand was active enough to have absorbed three times the quantity. The whole cost of producing this 700 ounces did not exceed $1200, while they sold for not less than $12,000. All these eggs were purchased for actual feeding, and have been distributed throughout the country, there to be propagated, and to add fresh stimulus to the business. Besides these, many hundred ounces have been imported from France, and have met with ready sale at $20 per ounce, even when purchased in quantities amounting to $1000 at a time. This article is in so great demand, that holders consider it no object to abate the price to secure a large sale. Still there is a scarcity of eggs, and the demand of this spring cannot be supplied. It is doubted whether the supply produced in 1839, from domestic increase and foreign importations united, will be sufficient to meet the demand for 1840. It is believed that not less than twenty millions of worms will be fed on the multicaulis this summer, within thirty miles round Philadelphia. At Burlington, a large company has gone into operation, with the sole view of raising silk. They do not own a single tree, and have therefore no stake in what is called the tree speculation. Their intention is to use the large amount of leaves that will be produced the present summer at Burlington, and to convince the incredulous that silk can be raised to great profit, on a scale of the greatest magnitude.

In addition to these facts, of which many similar might be readily adduced, there is a demand for silk reels, and silk machinery generally, which is astonishing even to those best acquainted with the business. These reels are furnished by the makers at a cheap rate, within the means of every small farmer, and are sold as fast as they can be manufactured. A manufactory of the celebrated Piedmontese reel has been established at Germantown, where the article is supplied at a low price. A knowledge of the art of reeling is thus being rapidly and extensively diffused over the country—as rapidly as any man ought to expect a new business to extend itself—and quite as much so as any other new enterprise within the reader's recollection. Such is the beginning of the silk business in Pennsylvania and New Jersey. That there is a solid foundation for it, the legislatures of nine states have emphatically asserted, by giving noble bounties to stimulate and sustain it.

PROGRESS OF SILK-CULTURE IN VIRGINIA.

To the foregoing article we are rejoiced to be able to add, that in Virginia the culture of silk has already been commenced by so many individuals, as to warrant the confident expectation that, by next season, it will be a regular and established business with hundreds who are now but novices and experimenters; and that their successful example will be soon followed by thousands of other beginners.

In the neighborhoods of Fredericksburg, Richmond, Petersburg, and in Brunswick county, this spirit is most extended and active. In and near Fredericksburg, are the oldest as well as among the most complete cocooneries—those of Messrs. W. K. Smith, and L. Y. Atkins. Near Richmond, Mr. Curtis Carter is one of those who are now feeding silk-worms to as great extent as temporary accommodations permit; and he is now erecting a new building for a cocoonery, 110 feet long by 30 in width, and two stories high. Mr. John Carter is also feeding to considerable extent; and Mr. Staples on quite a large scale. Sundry others, in and near Richmond, have experimented to less extent, and with results satisfactory to themselves under the existing circumstances.

In Brunswick, Mr. Thomas Hicks has enlarged and improved his facilities, first used last year, and will feed more largely. A joint-stock company is there also extensively engaged in feeding; and, as we have heard, perhaps a hundred separate individuals on a small scale of experiment.

In and near Petersburg, no one has yet prepared complete fixtures and accommodations, but several persons have commenced, or have determined to prepare for the regular business; and many have fed silk-worms this spring, under every variety of disadvantage, and yet generally with successful results, and fair products.

Lastly, though among the first in operation, in zeal, and, we doubt not, in future valuable results, are the occupiers of Bellona in Chesterfield; where no care is spared to acquire and to apply the best information on silk-culture; and whence, we trust, it will be diffused, for the instruction and profit of the whole commonwealth.

It would be unreasonable for any one of these new experimenters to expect *net profit* upon his first adventure. Of course, every such first trial *must* be made at loss. But it is a gratifying fact that very few persons have been discouraged by this price necessarily paid in advance for experience, and that nearly all whom we have heard from will continue the business, with greatly increased confidence and energy. The pioneers have, in effect, taxed themselves to pay a bounty for introducing and establishing silk-culture in Virginia; and thus, while the most zealous and public-spirited will bear all the burden of the tax, and first cost, they will but share with all their fellow citizens in the eventual benefits.

We trust that nothing now can obstruct the progress of this important new culture, and prevent its becoming a great business in the United States, and especially in Virginia and the other southern states. The establishment and diffusion of silk-culture will be the greatest agricultural and economical benefit ever gained by this great region.

except the introduction and use of calcareous manures; and these two great improvements will most happily unite with, aid, and give increased value to each other.

THE MULBERRY CROP, AND PRICES.

The planting of morus multicaulis trees this year in Virginia, and generally in the United States, has become so large and costly a business, that it forms an important item of agricultural labor, investment, and product; and on that score alone, deserves notice, whatever may be the opinion as to the propriety, and ultimate profit, of this direction of so much energy and so much capital.

Though there has been no lack of opinions, predictions, promises, and rumors, of prices of morus multicaulis plants of the growing crop, all seemed uncertain, and little worthy of trust, until very recently. Therefore, we have remained silent on this point, until we had facts, and such as were unquestionable, to report, instead of mere opinions, or rumors of prices and prospects.

There now can be no doubt of a general short crop of the morus multicaulis. Besides the many concurrent newspaper statements, which have been open to the public, we have had private letters and other information giving reports from Pennsylvania to Florida inclusive. All such reports are of very short crops—the numbers of plants standing in each particular lot stated as varying from one-half to one-tenth of the cuttings planted; and fewer persons exceeding the former proportion, than there are who fall short of the latter. Of our own planting, there is standing but three-eighths of the mature and well preserved cuttings planted. We have heard of but one place where the stand is reported to be all satisfactory; this is the vicinity of Burlington, New Jersey; and of this, our information is by no means full or precise.

The causes of the general and great failure of the cuttings to grow, (where sound and fresh, and properly preserved,) were, the following:

1st. In many cases, improper management in planting—in which some of the most experienced cultivators have suffered greatly; and almost every planter now knows some one or more great errors which he committed, and the avoiding of which would have prevented half his present loss.

2nd. The long and severe spring drought.

3rd. And still more, the planting of single-bud cuttings, which was done almost universally in the south, even when of the smallest size. As to cuttings of unripe extremities, which the raisers have planted extensively, there has been so total a failure, as to show that they are not to be relied on at any time.

We know nothing of the crop north of Pennsylvania, and it is almost too soon for it to be yet above ground. But there, every year will show a failure, or at least what would be considered a great failure here.

Mr. Prince, notwithstanding his undoubted great advantages at his own nursery and garden on Long Island, *has made a large planting in Virginia.* This is a most striking evidence of the vast superiority of our climate for this culture; and a not less complete admission of Mr. Prince's not confiding in his own former assertions and claims, in this publication, in favor of the northern growth. His argument, then maintained, if it needed any refutation, is now completely refuted by himself.

The whole crop of the United States, we infer, cannot much exceed half of the proportion expected to grow from the cuttings planted. Of course, whatever might have been the demand, for a full crop, must be greatly increased.

Not many sales of trees of the growing crop have yet been made in Virginia. In the early part of the year, a contract, as large as the buyer chose to make, was made to deliver trees, in Greensville county, next autumn, at 6¼ cents. Some other, and large contracts were made at 12½—and of these, one in Nottoway between two intelligent and wealthy landholders, was as late as two or three weeks ago. Still later, an entire lot of 20,000 trees were sold in this town for 15 cents each, not to include any under three feet high. In Richmond the following sales of growing trees have been made within the last week. Thomas J. White, esq. sold all the trees, of his crop (10,000 cuttings planted,) which may reach or exceed 3 feet in height, at 25 cents. Messrs. Hill and Dabney sold 3000 trees, all to be as high as 4 feet at 27 cents. Messrs. L. and R. Hill bought a lot, to include all of 4 feet and more, at 27½ cents. No holders there will now take offers of less than 25 cents the tree.

On the 24th of June, a small lot of the roots and young shoots of 50 trees (being all on the piece of ground, now in the fourth year from the planting of the buds,) raised by S. D. Morton, esq, of Petersburg, were sold by him for $5 each. The tops had been cut off at the ground last fall, and sold then at $10 each. As this is the only instance yet known of two successive years' sales from precisely the same stock and land, we had the curiosity to have the ground accurately measured. The trees occupy (*partly*, for the ground has also two rows of corn to each row of trees,) a space of 20 by 60 feet, including 3 feet of additional space beyond each outside row.

This is at the rate of 1815 trees to the acre; and at $15 each, the amount of cash sales for the two successive years' growth, from the same roots, is at the rate of $27,225 per acre. This is pretty well for a "humbug," (as some still call it,) of two years' duration.

We might state *reports*, and apparently on good authority, of sundry higher prices, offered and refused, or taken; but we have disregarded all rumors of prices, and all offers not accepted—as most of such reports are founded upon error, and *not a few upon fraudulent intention.* Judging however from the real transactions stated, it would seem that the price has been certainly and steadily advancing to this time, and that good profits at any rate may be secured by every planter, whose loss of plants does not exceed 80 in the 100. As to whether the prices have reached, or nearly reached, their greatest height—or whether they will (as most persons suppose,) rise much higher before the crop is ready to be delivered—we shall not presume to offer an opinion.

Since writing the above, a private letter from an extensive planter and dealer, in Burlington, New Jersey, has been shown to us by the friend to whom it was addressed, and at our request, permission was given to copy the following extract, which more than confirms what we had stated. The writer is a man who stands on the highest ground for sound discretion and judgment, and unimpeachable integrity. His facts are important. To his mere opinion, the reader may attach what degree of importance it may seem to deserve.

"*Burlington, N. J., 6 mo. 24th*, 1839.

"There are very great failures in this region of country, but at this place they are doing better than in most others. My trees, [from which the planting was made,] were not very large, it is true, but they were in very good condition; and yet they will not give me a return of more than 6 for 1. Some others have as much as 8 for 1, and one of my friends here has more than 12 for 1. But, from what I can learn, I think 5 for 1, will be a large calculation for New Jersey and Pennsylvania. I have a letter from Hartford, from a gentleman from this state, in which he says the trees in Connecticut, have come up badly. I have purchased about 60,000 to be delivered in the fall; the first 50,000, at 15 cents for three-feet trees, mature wood, exclusive of the roots, all raised from cuttings. These were purchased about two weeks ago; they would now bring 25 cents. The last purchase was 10,000 in this place, which I expect will be very fine, at 25 cents per tree, without reference to sizes. Several sales have been made here at 25 cents, and one of 6000, at 30 cents. The last is I think, the highest price yet obtained. But I believe they will be 50 cents, before next month expires."

STATE OF CROPS.

The condition of the wheat crop in Virginia is not only very different in different sections of the state, but in the same and small districts, and even on neighboring farms. Hence the impossibility of guessing at the general result, from particular reports. The product of numerous crops in the tide water region will be reduced, by the ravages of the Hessian fly, and still more of the chinch-bug, to less than the fourth of a fair crop; yet other farms in the same counties will make an average product. The relative product of the great divisions of the state (in general, though with many exceptions,) is still believed to be as stated in our last number; that is, increasing from very short crops in the tide water and adjacent higher counties, to better in the middle region, still better in the Piedmont range of counties, and to very fine crops in the great valley, or region west of the Blue Ridge.

The corn crops are good, and afford a fine prospect, except for the great danger of the chinch-bugs passing from the wheat to the corn fields. We wish that some of our readers would furnish for publication such facts as they have learned by observation, of the history and habits of this destructive insect. Such a subject at the north would have engaged the pens of scores of observing and suffering farmers; here, of not one.

Oats are very good, owing to the unusual amount of moist and cool weather in the latter part of spring.

The crop of tobacco is remarkably good.

LIMING.

To the Editor of the Farmers' Register.

It is one of the great blessings of man, that the discoveries and experience of past ages may be handed down from generation to generation, until time shall make his practice in the arts, sciences and professions, perfect. This is what he proudly calls mind, his electrical part; and yet sir, in truth what is he? A poor thing, a "wild ass's colt." We, sir, the good people of Virginia, received from the hands of our Heavenly Father the fairest, the kindest portion of dear old mother earth, and what is it now? Thorns and briers? No sir, it is gullies, sedge and poverty grass; the experience of ages has been scoffed; and like that proscribed animal of the Jews, we have rooted up and destroyed the pasture upon which we fed. Is this turning the experience and mind of past ages to our use and benefit? Have we done better in other matters necessary to the civilized man, than that which we have done in agriculture? I fear not, "wise in our own conceit," folly has had a mark to point at. I was going to show, sir, that we had done in many other matters as in agriculture, but I should trespass upon your rules and space, and shall, therefore, turn my pen to some report of our crop of wheat. This is good; for how could it be otherwise upon land well prepared and limed? Wheat, corn, oats and grass, all upon limed land, show that hitherto we have been in the dark, we have literally "toiled all night and caught no fish." None of those, or any other crops, can be made to fail upon limed land, if it be well

drained; and I could not give you a true description of those crops without incurring suspicion of inaccuracy. To make two or three times as much as I have ordinarily made, is almost matter of alarm; but I hope to get through with it, and could I persuade my friends and neighbors to lime their land, I should think that I had lived for some purpose. One thing is inexplicably strange. I have fine clover; and yet I am told that this has failed both in the lime-stone and mountain country. No address that I can use with my neighbors, can persuade them; they are far worse than Thomas O'Dedimus; for feeling or seeing will not avail me. But, sir, our march is onward; self-love, that powerful and controlling feeling, will make sure our success; for though pride may retard, interest will ultimately prevail. At a future time I will give you some account of the crops of my predecessor, compared with those now made; not for the purpose of boasting, for I feel that I have done but little; but to show you that, in spite of conceit and ignorance, our march is onward. That you will live to receive the homage of a grateful community, I doubt not, for you well deserve it. LIME.

P. S. I look soon for the day, when farmers will leave the dirty mire of party politics, and contend for the cheapest, and most sure protection of person and property. This is their duty and interest; and they cannot be so unwise as not to see it. One-half of the effort made in party politics would make millions of dollars' benefit to agriculture. Who can doubt therefore the ultimate results?

L.

Fairfax county, June 3rd, 1839.

ON THE SYSTEM OF HUSBANDRY PRACTISED IN LOUDOUN COUNTY, VIRGINIA.

From the American Farmer.

Loudon County, August 12th, 1818.

Dear Sir,—I have the pleasure to acknowledge the receipt of your's of July, and I venture, although but an indifferent pensman, to answer your queries on Loudoun husbandry. I hope you will excuse my manner of writing, and attend only to the matter which I shall communicate, which is founded on a long experience in agricultural pursuits; and as information is all you want, I shall endeavor to answer your queries, by taking them collectively, and in so doing, I shall confine myself to stubborn facts which cannot be disproved.

The first thing that I shall notice, is the plough. The improvement of this valuable machine, was the first step we took to improve our lands, we formerly adopted the absurd plan of shallow ploughing, leaving the under stratum unbroken, which should have been torn up and mixed with the surface; we have constructed our ploughs much larger and stronger than they formerly were; the mould-boards are all of cast iron. We seldom break up our land with less than three horses to a plough, which enables us to plough our ground deep. In the fall or early in the spring we break up our corn ground, then harrow it well with a heavy iron-toothed harrow; this done, checker it with a shovel plough, leaving our rows from 3½ to 4 feet apart, ready for planting. When we commence planting corn, we take out water and plaster of paris, and after wetting the corn, then put on as much plaster as will stick to it, and make the grains separate freely, and keep it in that state by adding water and plaster when necessary, until we are done planting. When our corn gets to the usual size for harrowing, say four or five inches high, we hitch two horses to a harrow, and run once over each row, minding to straighten all the corn that gets bent or covered up by this operation. When our corn is fit for thinning, we generally leave but two stalks in a hill; after we have done this, let our land be never so good, we take as much plaster as we can with a thumb and two fingers, and drop on each hill of corn; should drought succeed after we have done plastering, we do well to work our corn so as to cover the plaster, as long droughts and hot sun are injurious to its stimulating powers. This method of cultivating corn, is generally pursued here, and seven or eight barrels to the acre, is considered a saving crop, but ten or more to the acre is very common here.

I have been in the habit of using plaster more than twenty years, and its effects on every kind of vegetation (sedge-grass excepted, which it diminishes,) are surprisingly great. There is no arable and left unsown with clover seed here,—neither is plaster of so much benefit to land left bare of grass; plaster is not a manure, but a stimulus; it stimulates clover, and clover manures the land; three pecks of plaster are enough as a top dressing for clover per acre, and all kinds of small grain including hemp and flax, are benefited by the same quantity to the acre. Early in the spring we sow plaster on our clover pastures and grain fields. Our sheep are not permitted to run in the clover fields in the winter, and are kept out in the spring, until the clover is well grown—at this time also hogs are permitted to graze upon it, and if they are well salted, they will thrive as long as the clover lasts. The second crop injures stock, particularly horses, very much, by creating a slavering, and it is best to keep them off, and devote the second crop to seed, as it makes the best seed. We generally salt our clover hay, and put it under cover, not much together: mixing it with straw, answers a good purpose. In saving clover seed, the heads should be gathered quite dry, and kept in that state until sown. Those who save seed for market too often heat it, which prevents it from coming up; the good or bad quality of clover seed, may be discovered by filling a glass tumbler half full of water, and dropping a few seed in, those that sink are good, those that swim are generally deprived of their vegetating powers. Clean seed should be sown in the following manner. Let the weather be calm (which is also necessary for sowing plaster) and let the ground be laid off into eight feet lands; take as much seed as you can between your thumb and two fingers for every two casts or steps, and let the casts not exceed the width of the land. But we generally raise our own seed, and sow it in the chaff.

Wheat is grown here mostly upon fallowed land, which is prepared as follows: in the months of August and Setember, we turn our clover under nine or ten inches deep, in ten or fifteen days after we harrow the ground well, then sow and plough in the seed with a shovel plough in eight feet lands, this method saves the trouble of staking off the ground in the spring of the year, for sowing clover seed and plaster, which should be done

in March or April. But sowing fallow with one ploughing is the general practice here, we sow one and a half bushels of wheat on the acre. The average product of the wheat crops may be stated to be from 18 to 30 bushels to the acre; I have myself raised crops of wheat averaging 30 bushels to the acre off of fields, which, before I used plaster and clover, would not bring me more than 18 bushels.

Manure is a grand object here, every thing taken from the earth, when returned is beneficial to it. Mr. Madison has a more favorable opinion of corn-stalks than I have. Corn-stalks and buck-wheat straw, answer very well to fill gullies. When we got out our wheat we haul out the straw into the fields, and stack in pens on the poorest places of the field, and let our cattle have their will of it—all other coarse kinds of manure ought to be taken to the field before it loses any of its strength and ploughed in. Where there are but few or no slaves our farms are small, 150 or 200 acres is considered a good farm, one-third ought to lest uncleared—ten or twelve acres are sufficient for meadow, as we mow as much clover off our high land as we want.

All timothy meadows are the better of water, especially in the winter—throw the water over a bank and let it freeze no matter how deep. All wet land ought to be drained by ditching—if there is not very much water, cut your ditch two feet deep, and as wide, fill it half full with round stones, then take corn-stalks, leaves, buck-wheat straw, or any other trash and cover the stones, then fill the ditch with dirt, and it wants no more repairs.

There are different soils here, as many as two or three different kinds in one field; red land is the worst, and requires the most manure, the gray flint is the most durable. Our former mode of fencing was with split rails; but as wood grows scarce, we substitute stone, and that is one reason why our lands sells so high. From Potomac to Fauquier I suppose is 25 miles—from Goose creek to the Frederick line 20 miles. On this tract of land I suppose there is stone enough to inclose it all in 20 acre fields. Our mode of putting up stone fence, is as follows. 1st, Clear away the loose earth four feet wide, to prevent the frost from getting under it—then haul the largest stone, and put them in the bottom—taper it on each side till it is twelve inches wide on the top, this is done by stretching a line on each side, fixed to a frame like a rafter level four feet high, the shape of the fence. When the fence is raised four feet high with stone, we take stones that will reach across the top, and place them along the distance of the rails, lay one rail on each stone, then two stakes to each rail, and a rider on the top; this strengthens the fence and prevents sheep from climbing over.

I remain your obedient servant,

ROBERT RUSSELL.

Geo. W. Jefferies, Esq.

OSAGE ORANGE SEEDS.

The seeds of the Osage orange are in demand; and if any of our subscribers in the west can contrive to send a few bushels of seed to some of the Atlantic cities for sale, we have no doubt but it would be a profitable little adventure. The tree is very hardy, and is valuable for ornament, and for making live hedges, and it also furnishes good food for silk-worms; though the latter quality will be of little use in this country, as the mulberry is so little liable to suffer from spring frosts. See Far. Reg. pp. 35, 543 and 702, vol. iii.

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